AD-756 900

PRESSURE VESSELS

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PRESSURE VESSELS

A DDC BIBLIOGRAPHY

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13. ABSTRACT

This bibliography comprises citations of unclassified reports dealing with tests and applications of Pressure Vessels used for Tanks (containers), Submarine Hulls, Rocket Cases, Ramjet Engines and Guided Missiles.

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Tanks(Containers)						
Material Forming						
Maraging Steels						
Deep Submergence						
Welding						
Titanium Alloys						
Arc Welding						
Radiation Damage						
Submarine Hulls						
Rolling(Metallurgy)						
Underwater Vehicles						
Structural Shells						
Elastic Shells						
Hydrostatic Tests						
Impact Tests						
Containment Vessels						
Diaphragms(Mechanics)						
Anechoic Chambers						
Nuclear Reactors						
Mechanical Properties						
Structural Properties						

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ALEXANDRIA, VIRGINIA 22314

F O R E W O R D

This bibliography consists of 148 unclassified and unlimited reports on *Pressure Vessels*. These references were selected from entries processed into the Defense Documentation Center's data bank during the period of January 1953 through December 1972. This bibliography supersedes AD-702 600, DDC-TAS-70-22-1, dated March 1970.

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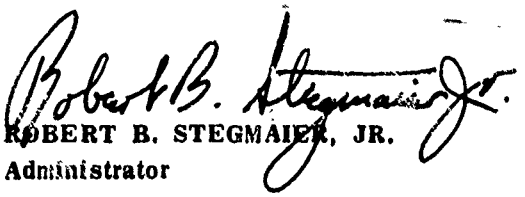

ROBERT B. STEGMAIER, JR.
Administrator
Defense Documentation Center

C O N T E N T S

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-295 424
AEROJET-GENERAL CORP AZUSA CALIF

STUDY OF THE EFFECTS OF THICKNESS ON THE PROPERTIES OF LAMINATED FOR UNDERWATER PRESSURE VESSELS. (U)

JAN 63 IV SAUNDERS,R.D.;SMITH,R.L.;
REPT. NO. 0623 01 3
CONTRACT: NOBS86406

UNCLASSIFIED REPORT

DESCRIPTORS: *LAMINATES, *PRESSURE VESSELS, HEAT, MECHANICAL PROPERTIES, PHYSICAL PROPERTIES, PLASTICS, REINFORCING MATERIALS, TEMPERATURE, THERMAL STRESSES, THICKNESS, UNDERWATER (U)

CONTINUING RESEARCH ON THE STUDY OF THE EFFECTS OF THICKNESS ON THE MECHANICAL AND PHYSICAL PROPERTIES OF FIBER-REINFORCED PLASTIC LAMINATES FOR CREEP SUBMERSIBLE EXTERNAL PRESSURE VESSELS.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-402 636
AVCO LYCOMING DIV STRATFORD CONN

METASTABLE AUSTENITIC FORMING OF HIGH STRENGTH PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: SEMIANNUAL INTERIM TECHNICAL PROGRESS REPT. NO. 2, 1 SEP 62-30 MAR 63,
APR 63 1V RAYMER,J.M.;
CONTRACT: AF33 657 7955

UNCLASSIFIED REPORT

DESCRIPTORS: *ROCKET CASES, *PRESSURE VESSELS, *STEEL, STAINLESS STEEL, TOOL STEEL, HOT WORKING, AUSTENITE, HYDROSTATIC PRESSURE, TESTS, MECHANICAL PROPERTIES, MATERIALS, MATERIAL FORMING, METAL SPINNING. (U)
IDENTIFIERS: H-11 STEEL, AM355 STAINLESS STEEL, 18NICOMO (330) STEEL. (U)

THREE SELECTED ALLOYS: TYPE H-11 TOOL STEEL, AM 355 SEMIAUSTENITIC STAINLESS STEEL, AND 18NICOMO (300) MARAGING STEEL, WERE FABRICATED INTO BIAXIAL PRESSURE VESSEL TEST SPECIMENS. FOR THE FABRICATION OF THE BIAXIAL PRESSURE VESSEL TEST SPECIMENS, DESIGNED EXPERIMENTS WERE UTILIZED TO EVALUATE A VARIETY OF PROCESSING AND HEAT TREAT VARIABLES. THE FABRICATED PRES SURE VESSELS (I.E. TUBES) WERE TESTED TO FAILURE IN A HYDROSTATIC TEST FACILITY AND EVALUATED FOR SELECTION OF AN OPTIMUM MATERIAL AND ASSOCIATED FABRICATION PROCESS FOR A HIGH PERFORMANCE, INTEGRAL ROCKET MOTOR CASE. BASED ON THESE STUDIES THE 18NICOMO (300) MARAGING STEEL AND A SPECIFIC PROCESSING SCHEDULE WERE SELECTED FOR PHASE II AND III EVALUATION. AN INTERMEDIATE SIZE CYLINDRICAL TEST SPECIMEN AND AN INTEGRAL SUBSCALE ROCKET MOTOR CASE WERE DESIGNED FOR PHASE II INVESTIGATION OF OPTIMIZED FABRICATION TECHNIQUES FOR THE MANUFACTURE OF AN INTEGRAL MOTOR CASE FROM 18NICOMO (300) MATERIAL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-403 122
VERMONT UNIV BURLINGTON

ON THE STRENGTH DEGRADATION OF FILAMENT WOUND PRESSURE VESSELS SUBJECTED TO A HISTORY OF LOADING. (U)

APR 63 9P OUTWATER,JOHN O.;SEIBERT, WILLARD J.;
REPT. NO. TM196
CONTRACT: NONR321901
PROJ: 62R05 19A

UNCLASSIFIED REPORT

DESCRIPTORS: *PRESSURE VESSELS, DEGRADATION, LOADING (MECHANICS), FIBERS, STRESSES, T, MATHEMATICAL ANALYSIS, EQUATIONS, TESTS, MATHEMATICAL PREDICTION, FILAMENT WOUND CONSTRUCTION. (U)

IF IT IS ASSUMED THAT THE RATE OF GROWTH OF A GRIFFITH CRACK THAT CONTROLS THE STRENGTH OF A FIBER IS PROPORTIONAL TO A POWER OF THE STRESS ON THAT FIBER WE CAN PREDICT THAT THE ULTIMATE STRENGTH OF A FILAMENT WOUND PRESSURE VESSEL DECREASES LINEARLY WITH THE TIME AT A GIVEN LOAD AND ALSO THAT THE TIME TO FAILURE WHEN THE VESSEL IS HELD AT A GIVEN LOAD WILL INCREASE LOGARITHMICALLY. BOTH THESE OBSERVATIONS ARE CONFIRMED EXPERIMENTALLY AND FORM THE BASIS FOR A SIMPLE METHOD OF PREDICTING THE LIFE OF A VES SEL AT ONE LOAD AFTER IT HAS BEEN HELD FOR A GIVEN TIME AT ANOTHER. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-403 459
ARDE-PORTLAND INC PARAMUS N J

CRYOGENIC STRETCH-FORMING OF SOLID-PROPELLANT ROCKET CASES. (U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL REPT. NO. 3, 1 DEC 62 1 MAR 63,
JAN 63 16P CLAFFY,GEORGE ;
CONTRACT: DA30 0690RD3501

UNCLASSIFIED REPORT

DESCRIPTORS: *ROCKET CASES, *STRETCH FORM ING, *PRESSURE VESSELS, *MANUFACTURING METHODS, COLD WORKING, CYLIDRICAL BODIES, CONFIGURATION, WELDS, HYDROFORMING (MECHANICAL), HIGH PRES SURE RESEARCH, INDUSTRIAL EQUIPMENT, PROGRAM MING, DESIGN, ANALYSIS. (U)

FIVE VESSEL CONFIGURATIONS (TOTAL OF TEN VESSELS) WERE CRYOGENICALLY STRETCHED PRIOR TO THE OCCUR RENCE OF A BREAKDOWN IN THE STRENGTH FACILITY. TWO OF THE CONFIGURATIONS INCORPORATED DOG-BONE COMPONENTS AND WERE STRETCHED AS PART OF THE PROGRAM TO DEVELOP THE ELLIPTICAL HEAD. A SIMPLE VESSEL INCORPORATING A THRUST SKIRT, AND TWO CONFIGURATIONS FOR PRODUCING HIGH-STRENGTH DOMES, WERE ALSO STRETCHED. TESTING WAS INTERRUPTED DUE TO A GROSS FAILURE OF THE CRYOGENIC PUMP OF THE STRETCH FACILITY. THE COMPUTER PROGRAM, FOR ANALYTICALLY DETERMINING THE FINAL SHAPE TO BE ACHIEVED BY CRYOGENICALLY STRETCHING A GIVEN PRE FORM VESSEL, WAS CHECKED AGAINST ACTUAL DATA FROM A STRETCHED VESSEL. THE RESULTS INDICATE THAT THE PLASTICITY EQUATIONS AND THE COMPUTER PRO GRAM ARE CAPABLE OF PREDICTING THE STRETCHED SHAPE WITH A HIGH DEGREE OF ACCURACY. THE FIRST SIMPLE, FULL-SIZE VESSEL WAS ASSEMBLED DURING THIS REPORT PERIOD AND REJECTED FOR BAD WELDS. THE PROBLEM PROVED TO BE ONE OF DIMENSIONAL TOL ERANCE ON THE HEAD DIAMETER. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-404 182
REPUBLIC AVIATION CORP MINEOLA N Y

EVALUATION OF HIGH-STRENGTH LIGHTWEIGHT LAMI NATED PRESSURE VESSELS OF LAP-JOINT CONSTRUCTION. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPORT NO. 4, 1 OCT TO 31 DEC 62
JAN 63 20P CITRIN,G.;
CONTRACT: DA30 069ORD3440
PROJ: 59332008
MONITOR: TR766 2 3 3

UNCLASSIFIED REPORT

DESCRIPTORS: *PRESSURE VESSELS, *ROCKET CASES, *BONDED JOINTS, JOINTS, BONDING, COBALT ALLOYS, MOLYBDENUM ALLOYS, SHEETS, PROCESSING, SPECI FICATIONS, RINGS, PRODUCTION, RUPTURE, TESTS, TENSILE PROPERTIES, STEEL, THICKNESS, BRAZING, WELDING, HYDROSTATIC PRESSURE, HEAT TREATMENT, METAL JOINTS, AGING (MATERIALS), HIGH TEMPERA TURE RESEARCH, DESIGN, FRACTURE (MECHANICS), METALLURGY, LAMINATES, ADHESIVES, NICKEL ALLOYS. (U)
IDENTIFIERS: LAP-JOINT CONSTRUCTION. (U)

THE PRODUCTION SHEET METAL MATERIAL WAS EVALUATED AGAINST SPECIFICATION REQUIREMENTS. RINGS WERE FABRICATED OF THE 0.021-IN. THICK MAR-AGING STEEL MATERIAL FOR THE FIRST 3 PRESSURE VESSELS. THE FIRST PRESSURE VESSEL WAS ASSEMBLED AND TESTED SUCCESSFULLY PRODUCING A BURST STRENGTH 7.9% GREATER THAN THAT INDICATED BY UNIAXIAL TENSILE TESTS OF THE PARENT SHEEL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-406 622
PICATINNY ARSENAL DOVER N J FELTMAN RESEARCH LABS

THE DEPENDENCE OF DYNAMIC STRENGTH OF CYLINDRICAL PRESSURE VESSELS ON GEOMETRICAL PARAMETERS. (U)

MAY 63 10P MACKENZIE ,A. IDALRYMPLE,E.

REPT. NO. PA-TM-1206
PROJ: DA-502-05-021

UNCLASSIFIED REPORT

DESCRIPTORS: *PRESSURE VESSELS, *CYLINDRICAL BODIES, CONTAINERS, PRESSURE, RUPTURE, GEOMETRIC FORMS, DESIGN, EXPERIMENTAL DATA, THEORY, CHARGES (EXPLOSIVE). (U)

EXPERIMENTAL INFORMATION WAS OBTAINED BY DETONATING SPHERES OF C4 EXPLOSIVE CENTRALLY LOCATED IN CYLINDRICAL CONTAINERS. SLIGHTLY DIFFERENT RESULTS WOULD BE EXPECTED FOR OTHER EXPLOSIVES. END CAPPING WAS ACCOMPLISHED BY PLACING THE PIPE IN A VERTICAL POSITION, STANDING ON A STEEL PLATE. ANOTHER THICK STEEL PLATE WAS PLACED OVER THE OPEN TOP END OF THE CYLINDER AND THE ASSEMBLY WAS LOADED DOWN WITH ABOUT 500 LBS OF LEAD. WITH THIS SYSTEM, EXPLOSIVE SPHERES OF DIFFERENT MASSES WERE DETONATED INSIDE THE CYLINDERS TO DETERMINE THE MAXIMUM AMOUNT OF EXPLOSIVE THAT COULD BE CONTAINED WITHOUT RUPTURE, INSIDE VARIOUS CYLINDERS. ONLY ONE SHOT WAS FIRED IN EACH CYLINDER. THE TECHNIQUES OF END CAPPING IN THIS EXPERIMENT IS NOT CRITICAL IF THE CYLINDERS HAVE A LENGTH OF 5 OR 6 TIMES THE INSIDE DIAMETER. THE SIDE WALL OF THE CYLINDER RECEIVES THE FIRST IMPULSE BEFORE THE END PLATES EXPERIENCE ANY DISTURBANCE. HIGH-SPEED PHOTOGRAPHS WERE TAKEN OF AN EXPANDING ALUMINUM PIPE LOADED WITH 12 GMS OF EXPLOSIVE. THE OUTSIDE DIAMETER WAS 3 INCHES AND THE WALL THICKNESS 1/4 INCH. THE EXPANSION TOOK PLACE IN ABOUT 50 MICROSEC. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-407 432
WATERTOWN ARSENAL LABS MASS

TRANSITIONAL BEHAVIOR OF HIGH-STRENGTH STEEL PRESSURE VESSELS, (U)

MAY 63 30P INGRAHAM,JOHN M.;
PROJ: 1HU 24401A111
MONITOR: WAL TR110 9 1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON MATERIALS FOR SOLID PROPELLANT ROCKET MOTORS.

DESCRIPTORS: *PRESSURE VESSELS, *STEEL, DENSITY, BRITTLENESS, TOUGHNESS, TENSILE PROPERTIES, MICROSTRUCTURE, LOW-TEMPERATURE RESEARCH, HARDNESS, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, TRANSITION TEMPERATURE, IMPACT SHOCK, THICKNESS, TESTS, FRACTOGRAPHY, SPHERES, HYDROSTATIC PRESSURE, FRACTURE (MECHANICS). (U)
IDENTIFIERS: STRENGTH TO WEIGHT RATIO, AISI 4340, VISCOJET 1000 STEEL. (U)

PRESSURE VESSELS OF NEARLY SPHERICAL GEOMETRY WERE HYDROSTATICALLY TESTED TO FAILURE AT VARIOUS TEMPERATURES TO DETERMINE THE FRACTURE TRANSITIONAL BEHAVIOR OF THE MATERIALS. A COMPARISON OF THE FRACTURE SURFACE MARKINGS WAS MADE WITH THOSE OF TENSILE TEST SPECIMENS FRACTURED AT SIMILAR TEST TEMPERATURES. NOTCH STRENGTH TO TENSILE STRENGTH RATIOS WERE DETERMINED USING BOTH ROUND AND FLAT TENSILE SPECIMENS FROM THE SAME ALLOYS. IT WAS CONCLUDED THAT THE FRACTURE TRANSITIONAL BEHAVIOR, IN PRESSURE VESSELS FABRICATED FROM HIGH-STRENGTH H11 STEEL AND LOWER STRENGTH AISI 4340 STEEL, COULD BE PREDICTED WITH REASONABLE CERTAINTY FROM FRACTURE SURFACE EVALUATIONS OF TENSILE SPECIMENS OF THE TYPE USED TO DETERMINE THE NOTCH STRENGTH TO TENSILE STRENGTH RATIOS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-408 278
REPUBLIC AVIATION CORP FARMINGDALE N Y

EVALUATION OF HIGH-STRENGTH LIGHTWEIGHT LAMINATED PRESSURE VESSELS OF LAP-JOINT CONSTRUCTION, (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 5, 1 JAN-31 MAR 63,
APR 63 57P CITRIN,G. ;
MONITOR: WAL REPT. NO. TR766 2 3 4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, MATERIALS), STEEL, LAMINATES, BONDING, BRAZING, ADHESIVES, CERAMIC MATERIALS, SHEETS, CYLINDRICAL BODIES, WELDING, ROCKET CASES, BONDED JOINTS, WELDS, MANUFACTURING METHODS (U)
IDENTIFIERS: MAR-AGING STEEL, INCO 250 KSI NICOMO, INCO 300 KSI NICOMO, LAP-JOINT CONSTRUCTION, 1963 (U)

FIVE PRESSURE VESSELS WERE ASSEMBLED AND TESTED TO FAILURE. THEY WERE FABRICATED OF THREE NOMINAL THICKNESSES OF MATERIAL, 0.025-, 0.040-, AND 0.064-IN.-THICK MAR-AGING STEEL. AN ANALYSIS OF THE RESULTS OF THESE TESTS INDICATED THE FEASIBILITY OF THE LIGHTWEIGHT LAMINATED PRESSURE VESSELS OF LAP-JOINT DESIGN AND SHOWED THE DIFFICULTY OF DEMONSTRATING A REPRODUCIBLE CONFIDENCE LEVEL WITH REUSABLE HEADER CLOSURES THAT HAD SUSTAINED SOME DEFORMATION DURING HYDROSTATIC TESTS TO HIGH-ENERGY LEVELS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-412 933
BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH

A LINEARIZED ANALYSIS OF THE PRESSURE WAVES IN A TANK UNDERGOING AN ACCELERATION. (U)

JUL 63 9P EHLERS,F.EDWARD ;
REPT. NO. MATHEMATICAL NOTE NO. 308

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: ALSO AVAILABLE FROM THE AUTHOR.

DESCRIPTORS: (*PRESSURE VESSELS, FLUID FLOW), (*TANKS (CONTAINERS), ANALYSIS), ACCELERATION, EQUATIONS, ROCKET MOTOR NOZZLES, PRESSURE, TIME, FUNCTIONS, SOUND, VELOCITY. (U)
IDENTIFIERS: 1963. (U)

THE RAPID ACCELERATION EXPERIENCED BY A ROCKET WITH A HIGH THRUST TO WEIGHT RATIO INFLUENCES THE RATE OF FLOW THROUGH THE NOZZLE, THEREBY ALTERING THE THRUST. TO OBTAIN SOME INSIGHT INTO THE EFFECTS OF ACCELERATION ON FLUID FLOWS, THE LINEARIZED EQUATIONS FOR THE ONE-DIMENSIONAL FLOW IN A CLOSED TANK ARE SOLVED FOR THE ACCELERATION PRESCRIBED AS A KNOWN FUNCTION OF TIME. THE WAVE PATTERN IS DESCRIBED IN DETAIL FOR THE FLOW INDUCED BY AN INSTANTANEOUS CON STANT ACCELERATION BEGINNING AT TIME. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-419 356
ARMY MATERIALS RESEARCH AGENCY WATERTOWN MASS

ANALYTICAL STUDY FOR A HYDRODYNAMIC TEST SYSTEM. (U)

SEP 63 25P SEMPLE,CHARLES W.;
PROJ: 1C542718D387
MONITOR: AMRA TR63 12

UNCLASSIFIED REPORT

DESCRIPTORS: (*HYDRODYNAMICS, TESTS), (*PRESSURE VESSELS, DESIGN), LOADING (MECHANICS), ANALYSIS, MEASUREMENT, COMPRESSIBLE FLOW, DENSITY, PRESSURE, FITTINGS, NUMERICAL ANALYSIS, FLUID FLOW, EQUATIONS. (U)
IDENTIFIERS: ACCUMULATORS, 1963. (U)

ANALYTICAL EQUATIONS RELATING SPECIMEN PRESSURE TO RISE TIME WERE DEVELOPED FOR SPECIMENS SUB JECTED TO INTERNAL PRESSURE BY A HYDRODYNAMIC LOADING SYSTEM. RISE TIME MEASUREMENTS WERE MADE DURING DYNAMIC PRESSURIZATION OF A PRESSURE VESSEL, AND THE EXPERIMENTAL AND ANALYTICAL RE SULTS COMPARED. THE EFFECTS OF VARIOUS SYSTEM PARAMETERS ON RISE TIME WERE ESTABLISHED FROM THE ANALYTICAL EQUATIONS. DESIGN GUIDE LINES ARE OUTLINED FOR THE CONSTRUCTION OF SIMILAR HY DRODYNAMIC SYSTEMS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-420 977
GOODYEAR AEROSPACE CORP AKRON OHIO

STUDY OF THE EFFECTS OF MECHANICAL DAMAGE ON THE PERFORMANCE OF FILAMENT-WOUND MOTOR CASES. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 3, 1 AUG-30 SEP 63,
OCT 63 19P BURKLEY,R. A. ;BOLLER,T. J. ;BUTCHER,I. R.;
REPT. NO. GER-11154B
CONTRACT: NOW-63-0449

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ROCKET CASES, FAILURE, (MECHANICS)), (*FILAMENT WOUND CONSTRUCTION, FAILURE (MECHANICS)), (*FAILURE (MECHANICS), PRESSURE VESSELS), (*PRESSURE VESSELS, FAILURE (MECHANICS)), WIRE-WINDING MACHINES, MANUFACTURING METHODS, GUIDED MISSILES (UNDERWATER-TO-SURFACE), GUIDED MISSILES (SURFACE TO SURFACE), NAVY, GLASS TEXTILES, MECHANICAL PROPERTIES, HIGH PRESSURE RESEARCH, TEST EQUIPMENT, TEST METHODS (U)
IDENTIFIERS: 1963, POLARIS (U)

THIS REPORT DISCUSSES THE CONCLUSION OF THE FABRICATION, MACHINE FLAWING, AND TESTING OF SIX-INCH DIAMETER FILAMENT-WOUND BOTTLES. IT WAS FOUND THAT THE BURST PRESSURE IS REDUCED BY A FLAW; HOWEVER, IT APPEARED THAT THE INTERSPERSED WINDING METHOD IMPROVED THE ABILITY OF THE CASE TO RESIST THESE FLAWS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-422 866
VERMONT UNIV BURLINGTON

THE EFFECT OF REPEATED LOADING ON FILAMENT WOUND INTERNAL PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: TECHNICAL MEMO.
SEP 63 18P OUTWATER,JOHN O. I
REPT. NO. NOLC-TM-43-14
CONTRACT: NONR321901
PROJ: 62R05 19A

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, FILAMENT WOUND CONSTRUCTION), (*LOADING (MECHANICS), PRESSURE VESSELS), FATIGUE (MECHANICS), ACOUSTIC PROPERTIES, FAILURE (MECHANICS), LARMINATES, GLASS TEXTILES, TEST METHODS, STRESSES, TENSILE PROPERTIES, HYDROSTATIC PRESSURE (U)
IDENTIFIERS: 1963 (U)

BY SUBJECTING THIN FILAMENT WOUND INTERNAL PRESSURE VESSELS TO REPEATED LOADS WITH DIFFERENT RATES OF LOADING, LOAD RANGES, AND DURATION OF PEAK LOADS; WE CONCLUDE THAT THE PRINCIPLE FACTOR INVOLVED IN THE FATIGUING OF THE VESSELS IS THE TOTAL DURATION UNDER LOAD. THE LIFE OF A VESSEL UNDER CYCLIC LOADING IS ABOUT THE SAME AS MIGHT BE EXPECTED WERE THE VESSEL TO BE HELD AT THE MAXIMUM LOAD UNTIL FAILURE THROUGH STATIC FATIGUE. AN EXPLANATION FOR THIS BEHAVIOR IS MADE QUALITATIVELY BY EXAMINING THE ACCOUSTICAL BEHAVIOR OF A VESSEL UNDER REPEATED LOADING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-423 216
GENERAL DYNAMICS/FORT WORTH TEX

PRELIMINARY REPORT ON FABRICATION AND TESTS OF AN ELECTRODEPOSITED PRESSURE BOTTLE, (U)

NOV 63 12P MOONEY,C. H. ,JR.;
REPT. NO. SR D6112
CONTRACT: AF33 657 11214

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, ELECTRODEPOSITION), (*ELECTRODEPOSITION, PRESSURE VESSELS), PROCESSING, SURFACES, PREPARATION, NITROGEN, BOILING, TIME, THERMAL CONDUCTIVITY, HEAT TRANSFER, PRESSURE, MEASUREMENT, TEST METHODS (U)
IDENTIFIERS: 1963 (U)

A DESCRIPTION IS GIVEN OF THE FABRICATION AND EVALUATION OF AN ELECTRODEPOSITED PRESSURE BOTTLE. THE TYPE OF MANDREL, SURFACE PREPARATION, ELECTRODEPOSITING SOLUTION, AND CURRENT ARE DISCUSSED PERTAINING TO FABRICATION. PRESSURE PROOF TESTS TO ESTABLISH STRUCTURAL CAPABILITY AND THERMODYNAMIC TESTS TO DETERMINE HEAT TRANSFER COEFFICIENTS ARE ALSO DISCUSSED IN THE REPORT. ASSOCIATED PROBLEMS AND RECOMMENDATIONS FOR FUTURE IMPROVEMENT ARE INCLUDED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-423 526
NAVAL RESEARCH LAB WASHINGTON D C

NEUTRON EMBRITTLEMENT OF REACTOR PRESSURE VESSEL STEELS, (U)

OCT 63 36P STEELE,L. E. ;HAWTHORNE,J. R.
;
REPT. NO. NRL-5984
PROJ: RRU07 01 46 5409 ,SR007 01 01
TASK: 0858

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, RADIATION DAMAGES), (*REACTOR MATERIALS, STEEL), (*PRESSURE VESSELS, STEEL), NEUTRONS, HEAT TREATMENT, NEUTRON BEAMS, DUCTILITY, NUCLEAR REACTORS, EXPERIMENTAL DATA, NUCLEAR POWER PLANTS (U)
IDENTIFIERS: 1963, NEUTRON EMBRITTLEMENT, HY 80 STEEL (U)

THIS REPORT PRESENTS THE STATUS OF OBSERVATIONS AT THE U. S. NAVAL RESEARCH LABORATORY ON THE EMBRITTLEMENT OF STEELS WHICH ARE COMMONLY USED FOR THE PRIMARY PRESSURE CONTAINMENT VESSELS OF NUCLEAR POWER PLANTS. THE DEMONSTRATED CRITERION OF NIL DUCTILITY TRANSITION (NDT) TEMPERATURE PROVIDES THE BASIS FOR MEANINGFUL ANALYSIS OF NEUTRON-INDUCED EMBRITTLEMENT IN REACTOR STEELS. RESULTS TO DATE INDICATE THAT THE DEGREE OF EMBRITTLEMENT DEPENDS UPON THE MATERIAL, THE NUETRON EXPOSURE, AND THE TEMPERATURE DURING IRRADIATION. THESE SAME VARIABLES ALSO AFFECT THE DEGREE OF NOTCH DUCTILITY RECOVERY EFFECTED BY POST-IRRADIATION HEAT TREATMENT. IN ADDITION, THE TIME AND TEMPERATURE OF HEAT TREATMENT HAVE BEEN SHOWN TO PLAY AN IMPORTANT ROLE IN ESTABLISHING THE RECOVERY PATTERN. THE VALIDITY OF THESE EXPERIMENTAL OBSERVATIONS ARE BEING TESTED THROUGH CORRELATIONS WITH DATA FROM REACTOR SURVEILLANCE PROGRAMS AND FROM SPECIMENS OF THE SL-1 REACTOR PRESSURE VESSEL. PRELIMINARY DATA FROM DOSIMETRY IN THE SM-1A REACTOR PERMIT THE EXTENSION OF EXPERIMENTAL DATA TO PREDICT THE INCREASE IN NDT OF THE REACTOR PRESSURE VESSEL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-425 162
NAVAL ORDNANCE LAB WHITE OAK MD

REVERSE YIELDING OF A FULLY AUTOFRETTAGED TUBE OF LARGE WALL RATIO, (U)

AUG 63 27P DAWSON,VICTOR C. D. ;SEIGEL, ARNOLD E. ;
REPT. NO. NOLTR-63-123

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CYLINDRICAL BODIES, MECHANICAL PROPERTIES), (*PRESSURE VESSELS, STRESSES), CREEP, HYDROSTATIC PRESSURE, MATHEMATICAL ANALYSIS, STRAIN (MECHANICS), ELASTICITY, PLASTICITY, EQUATIONS (U)
IDENTIFIERS: 1963, AUTOFRETTAGE (U)

THE EQUATIONS ARE DEVELOPED FOR THE CASE OF A REVERSE YIELDED THICK-WALLED CYLINDER. IT IS ASSUMED THAT A CYLINDER IS SUBJECTED TO AN INTERNAL PRESSURE WHICH CAUSES PLASTIC FLOW THROUGHOUT THE WALL; THE SIZE OF THE CYLINDER IS SUCH THAT THE RESIDUAL STRESSES DEVELOPED DURING PRESSURE RELEASE CAUSE THE CYLINDER TO REYIELD IN COMPRESSION. THE STRESS EQUATIONS FOR THE SUBSEQUENT REAPPLICATION OF PRESSURE TO THE REYIELDED CYLINDER ARE ALSO DEVELOPED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-425 196
AEROJET-GENERAL CORP SACRAMENTO CALIF

RESEARCH AND DEVELOPMENT IN SUPPORT OF THE POLARIS PROGRAM. TASK I. INVESTIGATION OF FILAMENT WINDING PATTERNS. (U)

DESCRIPTIVE NOTE: BI-MONTHLY PROGRESS REPT. NO. 3, 24 AUG-24 OCT 63, NOV 63 6P BRADLEY ,W. ;ZICKEL ,J. ; TONN ,G. H. ;SMITH ,K. W. ;GALUZEVSKI,R. A. ;
REPT. NO. AGC-062713
CONTRACT: NOW-63-0627

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, FILAMENT WOUND CONSTRUCTION), (*FILAMENT WOUND CONSTRUCTION, CONFIGURATION), STRUCTURAL PROPERTIES, RELIABILITY, GUIDED MISSILES (UNDERWATER-TO-SURFACE), GUIDED MISSILES (SURFACE-TO-SURFACE), NAVY, ROCKET CASES, HYDROSTATIC PRESSURE, STRESSES, DEFLECTION, DESIGN, ANALYSIS (U)
IDENTIFIERS: 1963, POLARIS (U)

THIS IS THE THIRD OF A SERIES OF BIMONTHLY REPORTS DESCRIBING PROGRESS IN A PROGRAM CONDUCTED TO INCREASE THE UNDERSTANDING OF THE INTERRELATION BETWEEN CHAMBER WINDING PATTERNS AND CHAMBER BEHAVIOR. ALL SIX OF THE ISOTENSOID UNITS REQUIRED FOR THIS PROGRAM HAVE BEEN FABRICATED. THREE OF THE FOUR UNITS TESTED HYDROSTATICALLY RUPTURED AT PRESSURES EXCEEDING THE DESIGN BURST PRESSURE. THE DATA ARE BEING ANALYZED. AN ANALYSIS THAT TAKES INTO CONSIDERATION THE STRENGTH OF THE RESIN IN DESIGNING ISOTENSOID FILAMENT-WOUND PRESSURE VESSELS HAS BEEN DEVELOPED AND PROGRAMMED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07.

AD-425 729
MELLON INST PITTSBURGH PA

A STUDY OF THE BEHAVIOR OF SMALL PRESSURE VESSELS UNDER BIAXIAL STRESS CONDITIONS AND IN THE PRESENCE OF SURFACE CRACKS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUN 63 165P BHAT,G. K. ;
REPT. NO. TM242
CONTRACT: NONR376400
PROJ: MI4396

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, FAILURE (MECHANICS)), (*STEEL, PRESSURE VESSELS), (*FAILURE (MECHANICS), PRESSURE VESSELS); (*STRESSES, PRESSURE VESSELS), FRACTURE (MECHANICS), FATIGUE (MECHANICS), HYDROSTATIC PRESSURE, SHEETS, HEAT TREATMENT, MANUFACTURING METHODS, TENSILE PROPERTIES, TABLES, STRAIN (MECHANICS) (U)
IDENTIFIERS: 1963, MARAGING 18 NI STEEL, HYDROBURST TESTS, BIAXIAL STRESSES (U)

RESULTS ARE PRESENTED OF A STUDY OF SMALL, SEAMLESS, THIN-WALL PRESSURE VESSELS OF SEVERAL ULTRAHIGH STRENGTH STEELS TESTED UNDER BIAXIAL STRESS CONDITIONS AND ALSO IN THE PRESENCE OF SURFACE FATIGUE CRACKS OF PREDETERMINED SIZES INSERTED ON THE EXTERIOR SIDEWALL OF THE VESSELS, PERPENDICULAR TO THE HOOP DIRECTION. BEHAVIOR OF THE TEST VESSELS UNDER BIAXIAL STRESS CONDITIONS IS CORRELATED TO THAT OF FLAT SHEET SPECIMENS, CONTAINING APPROXIMATELY SAME SIZE FATIGUE CRACKS, BUT TESTED UNDER UNIAXIAL STRESS. FLAWS APPEARED TO AFFECT THE PERFORMANCE OF THE MEDIUM CARBON (0.30 TO 0.35%) CONSTRUCTIONAL STEELS, AISI 4130, AMS 6434, MX-2 TO A LESSER DEGREE THAN HIGHER CARBON (0.40% AND HIGHER) AND HIGHER ALLOY CONSTRUCTIONAL STEELS. UNDER BIAXIAL STRESS CONDITIONS CRACKS HAVE A MORE POTENT INFLUENCE IN REDUCING THE STRESS CAPABILITY THAN UNDER UNIAXIAL STRESS FOR ALL MATERIALS, EXCEPT THE MARAGING 18NI STEELS WHICH EXHIBITED LOW CRACK SENSITIVITY. FRACTURE CONTROL MODE IN THE PRESENCE OF FLAWS IN ALL EXCEPT THE MARAGING 18NI STEEL PRESSURE VESSELS WAS K SUB IC INITIATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-426 431
NAVAL RESEARCH LAB WASHINGTON D C

PRACTICAL CONSIDERATIONS IN APPLYING LABORATORY FRACTURE TEST CRITERIA TO THE FRACTURE-SAFE DESIGN OF PRESSURE VESSELS, (U)

NOV 63 32P PELLINI,W. S. ;PUZAK,P. P. ;
REPT. NO. NRL-6030
PROJ: RR007 01 46 5414 ,SR007 01 01 0850 0854

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, DESIGN), (*FRACTURE (MECHANICS), TESTS), STEEL, MATERIALS, TEST METHODS, PRESSURE, TEMPERATURE, METAL PLATES (U)
IDENTIFIERS: 1963 (U)

TRENDS IN PRESSURE VESSEL APPLICATIONS INVOLVING HIGHER PRESSURES, LOWER SERVICE TEMPERATURES, THICKER WALLS, NEW MATERIALS, AND CYCLIC LOADING REQUIRE THE DEVELOPMENT OF NEW BASES IN THE SUPPORTING SCIENTIFIC AND TECHNOLOGICAL AREAS. THIS REPORT PRESENTS A ''BROAD LOOK'' ANALYSIS OF THE OPPORTUNITIES TO APPLY NEW SCIENTIFIC APPROACHES TO FRACTURE-SAFE DESIGN IN PRESSURE VESSELS AND OF THE NEW PROBLEMS THAT HAVE ARISEN IN CONNECTION WITH THE UTILIZATION OF HIGHER STRENGTH STEELS. THESE OPPORTUNITIES FOLLOW FROM THE DEVELOPMENT OF THE FRACTURE ANALYSIS DIAGRAM WHICH DEPICTS THE RELATIONSHIPS OF FLAW SIZE AND STRESS LEVEL FOR FRACTURE IN THE TRANSITION RANGE OF STEELS WHICH HAVE WELL-DEFINED TRANSITION TEMPERATURE FEATURES. THE REFERENCE CRITERIA FOR THE USE OF THE FRACTURE ANALYSIS DIAGRAM IS THE NIL-DUCTILITY TRANSITION TEMPERATURE OF THE STEEL, AS DETERMINED DIRECTLY BY THE DROP-WEIGHT TEST OR INDIRECTLY BY CORRELATION WITH THE CHARPY V TEST. POTENTIAL DIFFICULTIES IN THE CORRELATION USE OF THE CHARPY V TEST ARE DEDUCED TO REQUIRE ENGINEERING INTERPRETATION OF CHARPY V TEST DATA RATHER THAN TO INVOLVE BASIC BARRIERS TO THE USE OF THE TEST. THE RAPID EXTENSION OF PRESSURE VESSEL FABRICATION TO QUENCHED AND TEMPERED STEELS IS EXPECTED TO PROVIDE NEW PROBLEMS OF FRACTURE-SAFE DESIGN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-428 856
NAVAL ORDNANCE LAB WHITE OAK MD

DESIGN METHOD FOR DOUBLE-WALLED EXTERNAL PRESSURE VESSELS, (U)

OCT 63 1V CHURCHILL,M. V.;
REPT. NO. NOLTR-63-249

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, DESIGN), (*STRUCTURAL SHELLS, STIFFENED CYLINDERS), EQUATIONS, UNDERWATER ORDNANCE, STRESSES, ASPECT RATIO, STABILITY, ELASTICITY, OPTIMIZATION, LOADING (MECHANICS), ELASTIC SHELLS, BEAMS (STRUCTURAL) (U)
IDENTIFIERS: 1963 (U)

BY PURSUING THE ANALOGY WHICH EXISTS BETWEEN THE REINFORCED PRESSURE VESSEL AND THE BEAM ON AN ELASTIC FOUNDATION, AND BY SYSTEMATIC APPLICATION OF THE PRINCIPLE OF BALANCED DESIGN, A SET OF EQUATIONS IS DERIVED BY WHICH OPTIMUM VALUES FOR WALL THICKNESS, REINFORCEMENT SIZE AND SPACING CAN BE CALCULATED DIRECTLY FROM THE SHELL RADIUS, THE DESIGN PRESSURE, AND THE MECHANICAL PROPERTIES OF THE MATERIAL. THE ELEMENT OF TRIAL AND ERROR IS VIRTUALLY ELIMINATED ANE THE USE OF ITERATIVE METHODS IS RESTRICTED TO A FEW CASES IN WHICH CONVERGENCE IS QUITE RAPID. THE EFFECT OF RIGID END BULKHEADS IS DISCUSSED AND A MEANS OF MINIMIZING SECONDARY STRESSES FROM THAT SOURCE IS PROPOSED. A SAMPLE CALCULATION IS GIVEN AND A COMPARISON MADE WITH DESIGNS PRODUCED BY OTHER METHODS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-428 905
PENNSYLVANIA STATE UNIV UNIVERSITY PARK ORDNANCE RESEARCH LAB

SOLID GLASS AND CERAMIC EXTERNAL-PRESSURE VESSELS, (U)

JAN 64 IV STACHIW,J. D. ;
CONTRACT: NOW-63-0209

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, MATERIALS), (*CERAMIC MATERIALS, PRESSURE VESSELS), (*GLASS, PRESSURE VESSELS), UNDERWATER, BRITTLENESS, COMPRESSIVE PROPERTIES, WEIGHT, CREEP, FATIGUE (MECHANICS), UNDERWATER EXPLOSIONS, HYDROSTATIC PRESSURE, IMPACT SHOCK, PROTECTIVE TREATMENTS, ELASTICITY, STRESSES, ALUMINUM COMPOUNDS, OXIDES, STIFFENED CYLINDERS, JOINTS, MODEL TESTS, SHOCK RESISTANCE, ALUMINUM ALLOYS, OCEANOGRAPHIC VESSELS, SUBMARINES, DEFLECTION, PRESSURE, STRAIN (MECHANICS) (U)
IDENTIFIERS: 1964, PYROCERAM, ALUMINUM OXIDE, ALUMINUM ALLOY (U)

SOLID GLASS OR CERAMIC HULLS PROVIDE THE MAXIMUM BUOYANCY AND INTERNAL USEFUL VOLUME FOR UNDERWATER VEHICLES. THIS MATERIAL DISPLAYS LOW CREEP CHARACTERISTICS AND WITHSTANDS EXTERNAL PRESSURE CYCLING AND MILD UNDERWATER DYNAMIC PRESSURES. SCRATCHES ON THE EXTERIOR SURFACES DO NOT DECREASE APPRECIABLY THE COMPRESSIVE AND ELASTIC STRENGTH OF SUCH VESSELS WHEN EXPOSED TO EITHER STATIC OR CYCLING PRESSURE. CONNECTORS HAVE BEEN DEVISED THAT ENABLE GLASS CYLINDERS TO BE JOINED INTO A MONOLITHIC STRUCTURE THAT IS RESISTANT TO BOTH PRESSURE AND FLEXURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-429 031
LOCKHEED PROPULSION CO REDLANDS CALIF

DESIGN, FABRICATION AND HYDROTESTING OF A 120INCH DIAMETER PRESSURE VESSEL USING 18 PERCENT NICKEL MARAGING STEEL. (U)

DESCRIPTIVE NOTE: RESEARCH CONTRACT STATUS REPT. NO. 8, 10 OCT12 NOV 63,
JUN 63 67P COLBERT,L. ;
REPT. NO. 609 P8
CONTRACT: AF04 611 8525

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, STEEL), (*STEEL, PRESSURE VESSELS), HYDROSTATIC PRESSURE, FRACTURE (MECHANICS), NICKEL ALLOY, MARTENSITE, AGING (MATERIALS), AUSTENITE, DESIGN, FAILURE (MECHANICS), STRESSES, FRACTOGRAPHY, MICROSTRUCTURE, CORROSION, TENSILE PROPERTIES, MICROSCOPY, ELECTRON MICROSCOPY (U)
IDENTIFIERS: 1963, MARAGING STEEL (U)

THE DETAILED METALLURGICAL ANALYSIS WORK PERFORMED IN ORDER TO DETERMINE THE CAUSE OF CLOSURE PLATE FRACTURE DURING HYDROBURST TESTING OF THE LOCKHEED-EXCELCO 120-IN. DIAMETER, MARAGING 18% NICKEL STEEL PROTOTYPE BOOSTER CASE IS DESCRIBED. THE METALLOGRAPHIC AND MECHANICAL STRENGTH DATA PRESENTED HAS LED TO THE BELIEF THAT DELAMINATION OF THE PLATE WELDED TO THE RING FORGING IS LARGELY RESPONSIBLE FOR THE FAILURE OF THE CLOSURE PLATE AT AROUND HALF THE DESIGNED MEMBRANE STRESS. THE DELAMINATION ITSELF SEEMS TO HAVE BEEN TRIGGERED BY THE YIELDING OF THE RETAINED AUSTENITE AND CRACKING OF CARBIDES AND NITRIDES IN THE BANDED AREAS OF THE PLATE, LEADING TO THE FORMATION OF A CHAIN OF SMALL CRACKS FOLLOWED BY INTERPLANAR SEPARATION IN THE PLATE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-431 706
AEROSPACE CORP EL SEGUNDO CALIF

STRESSES IN THIN VESSELS UNDER INTERNAL PRESSURE, (U)

JAN 64 186P AU,NORMAN N. I
REPT. NO. TDR269 4304 5
CONTRACT: AF04 695 269
MONITOR: SSD TDR63 367

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, STRESSES), (*CYLINDRICAL BODIES, STRESSES), STRUCTURAL SHELLS, JOINTS, MATHEMATICAL ANALYSIS, LOADING (MECHANICS), ELASTICITY, STEEL, ALUMINUM, ELLIPSOIDS, HYDROSTATIC PRESSURE (U)
IDENTIFIERS: 1964, HEAD CLOSURES (U)

ELASTIC STRESSES ARE PRESENTED FOR THIN SHELLS OF REVOLUTION UNDER THE ACTION OF INTERNAL PRESSURE. THE FORMULAS GIVEN ARE DEVELOPED ON THE BASIS OF LOVE'S CLASSICAL SHELL THEORY. THE PRESSURE VESSEL CONFIGURATIONS UNDER CONSIDERATION CONSIST OF VARIOUS COMMONLY ENCOUNTERED HEAD CLOSURE DESIGNS INTEGRALLY JOINED TO CIRCULAR CYLINDRICAL SHELL SECTIONS. IN ADDITION TO THE MEMBRANE STRESSES, THE BENDING STRESSES RESULTING FROM FORCES AND MOMENTS AT THE JUNCTURES OF THE HEADS AND CYLINDERS ARE ALSO PRESENTED. THE CONCEPT OF EDGE INFLUENCE NUMBERS IS USED WHERE CONVENIENT TO EXPRESS THE DISCONTINUITY FORCES AND MOMENTS AT THE JUNCTION. MANY IMPORTANT PARAMETERS ARE EXPRESSED IN GRAPHICAL FORMS TO FACILITATE ANALYSIS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-438 009
AVCO LYCOMING DIV STRATFORD CONN

METASTABLE AUSTENITIC FORMING OF HIGH STRENGTH PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: SEMIANNUAL REPT. NO. 3, 1 APR-SEP 63,
OCT 63 54P RAYMER,J. M. ;
CONTRACT: AF33 657 7955

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, MATERIAL FORMING), (*MATERIAL FORMING, METAL SPINNING), MARAGING STEEL, STAINLESS STEEL, TOOL STEEL, PROCESSING, METALLOGRAPHY, HEAT TREATMENT, DEFORMATION, HYDROSTATIC PRESSURE, STATISTICAL ANALYSIS, MECHANICAL PROPERTIES, CYLINDRICAL BODIES, ROCKET CASES, AUSTENITE, MARTENSITE, MICROSTRUCTURE, AGING (MATERIALS), TEMPERATURE, TIME (U)
IDENTIFIERS: FACTORIAL DESIGN (U)

DETAILED ANALYSIS OF THE EFFECTS OF THE VARIOUS PROCESSING PARAMETERS EMPLOYED DURING PHASE I EFFORT WAS COMPLETED. MOST INFORMATION WAS OBTAINED FROM THE FULL FACTORIAL EXPERIMENT OF THE 18NICOMO (300) MARAGING STEEL, WHERE PARAMETRIC AND NON-PARAMETRIC ANALYSES WERE CARRIED OUT. FROM THESE ANALYSES, AN OPTIMUM COMBINATION OF PROCESSING PARAMETERS WAS DERIVED, AND INCORPORATED IN THE PROCESSING SCHEDULE OF THE INTERMEDIATE SIZE CYLINDRICAL TEST SPECIMEN. ALL NECESSARY FORGINGS IN 18 NICOMO (300) MARAGING STEEL AND TOOLING FOR FABRICATION WERE OBTAINED AND TWO 14.5 IN. DIAMETER CYLINDRICAL TEST BOTTLES WERE SPUN TO VERIFY THE RESULTS OBTAINED DURING PHASE I. EFFORT WAS MADE IN EVALUATING THE BACKUP APPROACH TO EFFECT CLOSURE OF THE AFT END BY A SHRINKING OPERATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-443 851
GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF

PHYSICAL AND MECHANICAL PROPERTIES OF PRESSURE VESSEL MATERIAL FOR APPLICATION IN A CRYOGENIC ENVIRONMENT. (U)

DESCRIPTIVE NOTE: YEARLY SUMMARY REPT., 15 MAY 63-15 MAY 64,
MAY 64 126P CHRISTIAN,J. L. ;YANG,C. T. ;WITZELL,W. E. ;
REPT. NO. 63 0818 3
CONTRACT: AF33 657 11289

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, MATERIALS), (*WELDS, TOUGHNESS), (*ALLOYS, MECHANICAL PROPERTIES), LOW-TEMPERATURE RESEARCH, CRYOGENICS, FATIGUE (MECHANICS), ALUMINUM ALLOYS, NICKEL ALLOYS, MARAGING STEELS, STAINLESS STEEL, TITANIUM ALLOYS, SPACE VEHICLES, ROCKET CASES, SHEETS, FRACTURE (MECHANICS), EXPERIMENTAL DATA, TABLES, STATISTICAL ANALYSIS, CHEMICAL ANALYSIS (U)
IDENTIFIERS: ALUMINUM ALLOY 7039-T6, STEEL 18NI, HASTELLOY (ALLOYS), INCONEL (ALLOYS), FRACTURE TOUGHNESS, STAINLESS STEEL 304, RENE 41 (ALLOY), TITANIUM ALLOY 6AL 4V, STAINLESS STEEL 310, ALUMINUM ALLOY 2219-T81 (U)

THE OBJECTIVES OF THIS INVESTIGATION ARE A DISCUSSION OF THE TEST PROGRAM AND SELECTION OF TEST MATERIALS; A BRIEF DESCRIPTION OF TEST SPECIMENS AND APPARATUS IS GIVEN. TEST RESULTS ARE DISCUSSED. TEST DATA INCLUDE TENSILE, NOTCHED TENSILE, WELD TENSILE, AXIAL FATIGUE, AND CRACK PROPAGATION PROPERTIES OF 7039-T6 ALUMINUM ALLOY, 18% NICKEL MARAGING STEEL, HASTELLOY B, AND 718 NICKEL BASE ALLOY FROM 75 TO -423 F. PLANS FOR FUTURE WORK, ARE GIVEN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-458 251
THOMPSON (H I) FIBER GLASS CO GARDENA CALIF

INVESTIGATION OF ADVANCED DESIGN CONCEPTS FOR DEEP SUBMERSIBLES. (U)

DESCRIPTIVE NOTE: FINAL REPT., 8 JAN 64-8 FEB 65,
FEB 65 1V AXILDSKOV,D. ;DAINES,J. ;
CONTRACT: NOBS90180
PROJ: R007 03 04 ,KITCOPROJ. 231292
TASK: 1008

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SUBMARINE HULLS, DESIGN), (*PRESSURE VESSELS, FILAMENT WOUND CONSTRUCTION), (*FILAMENT WOUND CONSTRUCTION, MECHANICAL PROPERTIES), STIFFENED CYLINDERS, SANDWICH CONSTRUCTION, GLASS TEXTILES, COMPOSITE MATERIALS, LAMINATES, EPOXY PLASTICS, EXPANDED PLASTICS, BUCKLING, BONDING, BONDED JOINTS, MODEL TESTS, HYDROSTATIC PRESSURE, CYLINDRICAL BODIES, STRUCTURAL SHELLS, STRESSES, MATHEMATICAL ANALYSIS, MAYERIAL FORMING, STRUCTURES (U)

THIS PROGRAM INVESTIGATED DESIGN CONCEPTS OF FILAMENT-WOUND DEEP-DIVING SUBMERSIBLE VEHICLES. SMALL SCALE CYLINDRICAL SHELL MODELS WERE DESIGNED, FABRICATED AND TESTED UNDER HYDROSTATIC EXTERNAL PRESSURE. MODEL CONFIGURATIONS EVALUATED INCLUDE RING-STIFFENED CYLINDERS WITH BOTH CONSTANT AND VARIABLE WALL THICKNESS BETWEEN RING STIFFENERS, SANDWICH-WALL AND BILAYER DESIGNS. THE TARGET COLLAPSE PRESSURE WAS 13,333 PSI. PROBLEMS OF MAJOR CONCERN WERE DEVELOPMENT OF ANALYTICAL TECHNIQUES TO PREDICT STRESS LEVELS AND BUCKLING PRESSURES, DISCONTINUITY LOADS AT THE MODEL ENDS, ADHESIVE BONDS IN THE SANDWICH-WALL MODELS, OBTAINING HOLLOW GLASS WITH THE DESIRED HOLLOWNESS RATIO AND DEFINING MATERIAL PROPERTIES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-467 730
PICATINNY ARSENAL DOVER N J FELTMAN RESEARCH LABS

DESIGN OF PRESSURE VESSELS FOR CONFINING EXPLOSIVES. (U)

DESCRIPTIVE NOTE: TECHNICAL MEMO.,
JUL 65 25P MACKENZIE,A. ;DALRYMPLE,E.
W. ;SCHWARTZ,F. ;
PROJ: 1C10501A07
MONITOR: PA TM-1643

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, DESIGN), MATERIALS, ALLOYS, ALUMINUM ALLOYS, STAINLESS STEEL, LEAD, METAL PLATES, DETONATION WAVES, SHOCK WAVES, EXPLOSION EFFECTS, ATTENUATION (U)
IDENTIFIERS: ALUMINUM ALLOY 7075, STAINLESS STEEL 304, ALUMINUM ALLOY 2024, ALUMINUM ALLOY 6061, ALUMINUM ALLOY 5456, ALUMINUM ALLOY 5086 (U)

FACTORS WHICH MUST BE CONSIDERED IN DESIGNING PRESSURE VESSELS TO WITHSTAND, IN A RADIATION ENVIRONMENT, HIGH, RAPIDLY APPLIED DYNAMIC IMPULSES (SUCH AS EXPLOSIONS) ARE DEFINED AND DISCUSSED. OF VARIOUS METALS TESTED FOR USE IN THE WALLS OF SUCH VESSELS, SEVERAL ALUMINUM ALLOYS WERE FOUND MOST PROMISING. SMALL AMOUNTS OF EXPLOSIVE WERE INITIATED INSIDE CYLINDERS MADE OF VARIOUS METALS (ALUMINUM ALLOYS, STAINLESS STEEL, AND LEAD), THE CYLINDERS BEING CLOSED AT THE ENDS BY BEING PLACED VERTICALLY ON A STEEL PLATE AND TOPPED WITH A SECOND STEEL PLATE HELD IN PLACE WITH A 500-POUND LEAD WEIGHT. CYLINDER LENGTH WAS VARIED FROM 18 TO 24 INCHES, DIAMETER FROM 3 TO 12 INCHES, AND WALL THICKNESS FROM 1/8 TO 1 INCH. AS AN XPLOSIVE, SPHERICAL CHARGES OF C4 WERE USED. THE WALL MATERIALS TESTED WERE 6061-T6, 2024-T4, 5086-H32, 5456-H323, AND 7075-T6 ALUMINUM ALLOYS; 304 STAINLESS STEEL; AND LEAD. THE REPORT CONTAINS SPECIAL SECTIONS ON THE DESIGN OF END CLOSURES, SHOCK ATTENUATION, PROVIDING FOR ELECTRICAL LEAD-THROUGHS NEEDED FOR INSTRUMENTATION, AND THE USE OF A THIN WINDOW IN THE VESSEL (NEEDED FOR IRRADIATION EXPERIMENTS). FROM THIS INFORMATION A PRESSURE VESSEL FOR A PARTICULAR APPLICATION CAN BE DESIGNED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-600 215
WHITTAKER CORP SAN DIEGO CALIF NARMCO RESEARCH AND DEVELOPMENT DIV

FILAMENT-WOUND PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: FINAL REPT., 5 SEP 62-5 DEC 63,
DEC 63 103P WILSON,FRANK;
CONTRACT: AF34 601 14053

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, FILAMENT WOUND CONSTRUCTION), (*FILAMENT WOUND CONSTRUCTION, PRESSURE VESSELS), AIRCRAFT EQUIPMENT, GAS CYLINDERS, COMPOSITE MATERIALS, GLASS TEXTILES, WINDING, GEOMETRIC FORMS, PERFORMANCE (ENGINEERING), STANDARDS, HIGH-PRESSURE RESEARCH (U)

AIR PRESSURE STORAGE VESSELS ARE REQUIRED IN HIGH-PERFORMANCE AIRCRAFT TO PERFORM VARIOUS EMERGENCY FUNCTIONS. GLASS FILAMENT-WOUND BOTTLES AFFORD A SUBSTANTIAL WEIGHT SAVINGS OVER STEEL, AND ARE LESS SUBJECT TO CORROSION PRORLEMS. HOWEVER, THEY HAVE BEEN SUBJECT TO FATIGUE FAILURES BECAUSE OF THE STRESSES IMPOSED ON THE RELATIVELY WEAK RESIN BINDER SYSTEM. BY REDESIGNING THE SPHERICAL BOTTLE TO A CYLINDRICAL SHAPE HAVING ISOTENSOID DOME ENDS, AND BY USING THE MULTISHELL METHOD OF FABRICATION, A WEIGHT SAVINGS OF 10% TO 15% COUPLED WITH AN INCREASE IN ULTIMATE BURST PRESSURES OF 15% TO 30% HAS RESULTED. THIS REDESIGNING TAKES ADVANTAGE OF THE UNIDIRECTIONAL STRENGTH CHARACTERISTICS OF THE GLASS FILAMENT AND REDUCES THE STRESS ON THE RESIN BINDER SYSTEM TO AN ACCEPTABLE LEVEL. RESULTS OF COMPARATIVE TESTING ON THE REDESIGNED VESSELS AND ON GOVERNMENT FURNISHED VESSELS INDICATE THAT THE SPECIFICATIONS FOR VESSEL PERFORMANCE SHOULD BE MATERIALLY UPGRADED. CHANGES IN MIL-T-25363B TO REDUCE COSTS AND INCREASE RELIABILITY ARE RECOMMENDED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-600 336
DAVID TAYLOR MODEL BASIN WASHINGTON D C

AN EXPERIMENTAL INVESTIGATION OF CLOSURES AND PENETRATIONS FOR PRESSURE VESSELS OF COMPOSITE CONSTRUCTION, (U)

FEB 64 38P KIERNAN,THOMAS J. ;KRENZKE, MARTIN A. ;
REPT. NO. DTMB-1732
PROJ: S F013 01 03

UNCLASSIFIED REPORT

DESCRIPTORS: (•PRESSURE VESSELS, COMPOSITE MATERIALS), (•PRESSURE VESSELS, PENETRATION), STEEL, REINFORCING MATERIALS, CYLINDRICAL BODIES, HEMISPHERICAL SHELLS, STRAIN (MECHANICS), FATIGUE (MECHANICS), OCEANOGRAPHIC VESSELS, HIGH-PRESSURE RESEARCH, SUBMARINE HULLS (U)

AN EXPERIMENTAL INVESTIGATION WAS MADE OF CLOSURES AND PENETRATIONS FOR PRESSURE VESSELS OF COMPOSITE CONSTRUCTION DESIGNED FOR DEEP DEPTHS. A METHOD IS PRESENTED FOR DESIGNING REINFORCEMENT FOR PENETRATIONS THROUGH HEMISPHERICAL CLOSURES TO PROVIDE MEMBRANE BOUNDARIES. TEST RESULTS INDICATE THAT NO SERIOUS DIFFICULTY IS INVOLVED IN CLOSING AS WELL AS PENETRATING CYLINDRICAL HULLS OF COMPOSITE CONSTRUCTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-602 048
MARQUARDT CORP VAN NUYS CALIF

RAMJET TECHNOLOGY PROGRAM, 1963. SECTION XIV. AEROTHERMAL CAPABILITY OF PLASMA HEATERS. SECTION XV. HIGH PRESSURE AIR GENERATION. (U)

DESCRIPTIVE NOTE: FINAL SUMMARY REPT., VOL. II, 25 JAN 63-28 FEB 64,
JUN 64 85P TOTTEN,J. K. ;
REPT. NO. 25 116
CONTRACT: AF33 657 12146

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*RAMJET ENGINES, ENGINE AIR SYSTEMS COMPONENTS), (*PLASMA JETS, HIGH-PRESSURE RESEARCH), (*PRESSURE VESSELS, ENGINE AIR SYSTEMS COMPONENTS), JET ENGINES, HEATERS, PLASMA PHYSICS, ELECTRIC ARCS, SUPERSONIC FLOW, THERMAL RADIATION, ENTHALPY, ELECTRODES, MAGNETIC FIELDS, CRYOGENICS, GAS GENERATING SYSTEMS, FEASIBILITY STUDIES (U)

THE OBJECTIVE OF THE PLASMA ARC HEATER PROGRAM WAS BASICALLY TO DESIGN, FABRICATE, AND TEST PLASMA HEATERS CAPABLE OF OPERATING AT PRESSURE LEVELS BEYOND THE CURRENT STATE-OF THE-ART. ONE PARTICULARLY OUTSTANDING TEST RUN WITH AIR AT 2800 PSIA PRODUCED A GAS ENTHALPY LEVEL OF 3150 BTU/LB AT A 0.135 LB/SEC FLOW RATE WITH AN ARC POWER OF 1.12 MW. ANOTHER EXPERIMENTAL ARC HEATER WAS SUCCESSFULLY OPERATED AT 7600 PSIA OR APPROXIMATELY 200 ATMOSPHERES. THIS PLASMA HEATER DEMONSTRATED THE FEASIBILITY OF ARC HEATERS AT EXTREMELY HIGH PRESSURES. THE PURPOSE OF THE HIGH PRESSURE AIR GENERATION PROGRAM WAS TO DEMONSTRATE THE PRACTICABILITY OF CREATING EXTREMELY HIGH PRESSURES UTILIZING THE PRINCIPLE OF HEATING A CRYOGENIC FLUID IN A CONSTANT VOLUME VESSEL. THE NUMERICAL GOAL OF PRESSURE LEVELS IN EXCESS OF 50,000 PSIA WAS SUCCESSFULLY MET WHEN ONE TEST RUN ATTAINED A PRESSURE LEVEL OF 62,800 PSIA, AT A FLUID TEMPERATURE OF 790R. IN ADDITION, A METHOD FOR OBTAINING AND DOCUMENTING PRESSURE, VOLUME, AND TEMPERATURE DATA AT PRESSURES IN EXCESS OF CURRENTLY AVAILABLE INFORMATION WAS SUCCESSFULLY DEMONSTRATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-603 694
BATTELLE MEMORIAL INST COLUMBUS OHIO

DESIGN, PERFORMANCE, FABRICATION, AND MATERIAL CONSIDERATIONS FOR HIGH-PRESSURE VESSELS, (U)

MAR 64 286P MILLS,E. J. ;ATTERBURY,T. J. ; CASSIDY,L. M. ;EIBER,R. J. ;DUFFY,A. R. ;
CONTRACT: DA01 021AMC2032
MONITOR: RSIC , 173

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, MANUFACTURING METHODS), (*WELDING, PRESSURE VESSELS), STRUCTURES, DESIGN, PERFORMANCE (ENGINEERING), LOADING (MECHANICS), CARBON ALLOYS, STEEL, STAINLESS STEEL, MARAGING STEELS, MATHEMATICAL ANALYSIS, TITANIUM ALLOYS, ALUMINUM ALLOYS, NICKEL ALLOYS, CLADDING, WELDS, AIRBORNE, MECHANICAL PROPERTIES, STRESSES, RADIOGRAPHY, BIOBLIOGRAPHIES, NON-DESTRUCTIVE TUSTING (U)

BOTTLES AND TANKS FOR HIGH PRESSURES OF 5000 POUNDS PER SQUARE INCH AND ABOVE ARE DISCUSSED UNDER THE CLASSIFI CATIONS OF DESIGN, PERFORMANCE, FABRICATION, AND MATERIAL CONSIDERATIONS. SINGLE-WALLED, MULTILAYERED, AND BANDED PRESSURE VESSELS ARE CONSIDERED TOGETHER WITH MANUFACTURING METHODS. TEST PROCEDURES AND FRACTURE INITIATION AND PROPAGATION ARE DISCUSSED AND ANALYZED. CONSIDERATION IS ALSO GIVEN TO MATERIALS AND SPECIFICATIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-606 696
NAVAL RESEARCH LAB WASHINGTON D C

IN-DEPTH EMBRITTLEMENT TO A SIMULATED PRESSURE VESSEL WALL OF A302-B STEEL, (U)

SEP 64 22P SERPAN,C. Z. ,JR.;STEELE,L. E. ;

REPT. NO. NRL-6151
CONTRACT: AT49 5 2110
PROJ: RR007 01 46 5409,SR007 01 01
TASK: 0858

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LEGIBILITY OF THIS DOCUMENT IS IN PART UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM BEST AVAILABLE COPY.

DESCRIPTORS: (*PRESSURE VESSELS, REACTOR SYSTEM COMPONENTS), (*REACTOR MATERIALS, STEEL), (*STEEL, BRITTLENESS), (*RADIATION DAMAGE, REACTOR MATERIALS), DUCTILITY, POWER REACTORS, TRANSITION TEMPERATURE, THICKNESS, MANGANESE ALLOYS, NICKEL ALLOYS, CHROMINUM ALLOYS, MOLYBDENUM ALLOYS (U)
IDENTIFIERS: STEEL A302-B (U)

BECAUSE OF THE SELF SHIELDING AND ATTENUATION PROPERTIES OF THE VESSEL MATERIAL, A NUCLEAR REACTOR PRESSURE VESSEL WILL HAVE A NEUTRON FLUX AND SPECTRUM VARIATION ACROSS ITS THICKNESS. AS A RESULT OF THIS VARIATION, A PRESSURE VESSEL SHOULD SHOW VARIOUS DEGREES OF NEUTRON-INDUCED EMBRITTLEMENT THROUGHOUT ITS THICKNESS, AND THATIT IS POSTULATED THAT THE EMBRITTLEMENT WILL BE GREATEST AT THE INNER WALL AND LEAST AT THE OUTER WALL. THIS PHENOMENON HAS BEEN INVESTIGATED BY THE IRRADIATION OF A LARGE BLOCK OF A302-B STEEL AT THE CORE FACE OF A POOL REACTOR IN A POSITION SIMULATING THE LOCATION OF AN ACTUAL PRESSURE VESSEL. THE STEEL BLOCK, 6 IN. THICK, WAS MADE TO ACCOMMODATE FIVE EQUALLY SPACED ASSEMBLIES OF CHARPY V-NOTCH SPECIMENS WHICH, IN TURN, REPRESENTED THE VESSEL MATERIAL AT COMPARABLE POSITIONS. THE NOTCH DUCTILITY TEST RESULTS OF THE IRRADIATED SPECIMENS DEMONSTRATE A SIGNIFICANT DEGREE OF EMBRITTLEMENT AS WELL AS A SIGNIFICANT DECREASE IN THE DEGREE OF EMBRITTLEMENT THROUGH THE SIMULATED PRESSURE VESSEL WALL. HOWEVER, THE OBSERVED DECREASE IS SMALL WHEN RELATED TO THE RESPECTIVE VARIATION IN NEUTRON DOSAGE.

(U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-606 773
NAVAL RESEARCH LAB WASHINGTON D C

IN-REACTOR STUDIES OF LOW CYCLE FATIGUE PROPERTIES OF A NUCLEAR PRESSURE VESSEL STEEL. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUL 64 30P HAWTHORNE,J. R. ;STEELE,D. E.
;
REPT. NO. NRL-6127
CONTRACT: AT 49 5 2110
PROJ: RR007 01 46 5409 ,SR007 01 01
TASK: 0858

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH THE NAVY BUREAU OF SHIPS AND THE U. S. STEEL CORP. LEGIBILITY OF THIS DOCUMENT IS IN PART UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM BEST AVAILABLE COPY.

DESCRIPTORS: (*PRESSURE VESSELS, REACTOR SYSTEM COMPONENTS), (*REACTOR MATERIALS, STEEL), (*STEEL, REACTOR MATERIALS), (*RADIATION DAMAGE, STEEL), (*FATIGUE (MECHANICS), REACTOR MATERIALS), HEAT TREATMENT, MANGANESE ALLOYS, NICKEL ALLOYS, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, METAL PLATES, POWER REACTORS, TEST EQUIPMENT (U)
IDENTIFIERS: STEEL A 302-B (U)

AN EXPERIMENTAL IRRADIATION ASSEMBLY AND ASSOCIATED INSTRUMENTATION WHICH HAVE BEEN DEVELOPED AND SUCCESSFULLY UTILIZED FOR THE PERFORMANCE OF DYNAMIC IN-REACTOR LOW CYCLE FATIGUE TESTS OF REACTOR PRESSURE VESSEL STEELS ARE DESCRIBED. THE EQUIPMENT PROVIDES FOR THE SIMULTANEOUS REVERSE BEND TESTING OF AS MANY AS FIFTEEN SHEET TYPE SPECIMENS REPRESENTING A RANGE OF STRAIN AMPLITUDES AT CONTROLLED TEMPERATURES IN THE RANGE 300 TO 700F. THE RESULTS OF AN EXPLORATORY INVESTIGATION ON THE FATIGUE RESISTANCE OF ASTM TYPE A302-B STEEL DURING IRRADIATION AT 500F ARE PRESENTED AND COMPARED WITH DATA FROM OUT-OF-REACTOR CONTROL TESTS. THESE PRELIMINARY DATA DO NOT INDICATE ANY PRONOUNCED DIFFERENCE IN THE FATIGUE STRENGTH OF IRRADIATED VERSUS UNIRRADIATED STEEL. EXPLORATORY INVESTIGATIONS ARE CONTINUING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-609 565
NAVAL RESEARCH LAB WASHINGTON D C

YANKEE REACTOR PRESSURE VESSEL SURVEILLANCE: EVALUATION OF SPECIMENS EXPOSED DURING THE SECOND CORE, (U)

NOV 64 19P SERPAN,C. Z. , JR. ;WATSON ,H. E. ;HAWTHORNE ,J. R. ;STEELE,L. E. ;
REPT. NO. NRL-6179
CONTRACT: AT49 5 2110
PROJ: PR007 01 46 5409,SR007 01 01
TASK: 0858

UNCLASSIFIED REPORT

DESCRIPTORS: (*RADIATION DAMAGE, STEEL), (*STEEL, RADIATION DAMAGE), (*PRESSURE VESSELS, STEEL), RADIATION MEASUREMENT SYSTEMS, RADIATION MONITORS, NUCLEAR REACTORS, TEST METHODS, FAST NEUTRONS, TRANSITION TEMPERATURE, DUCTILITY, PHYSICAL PROPERTIES, HEAT TREATMENT, NUCLEAR POWER PLANTS (U)
IDENTIFIERS: YANKEE ATOMIC POWER REACTOR (U)

PRESSURE VESSEL SURVEILLANCE SPECIMENS FROM FOUR CAPSULES IN ACCELERATED IRRADIATION POSITIONS OF THE YANKEE ATOMIC POWER REACTOR HAVE BEEN TESTED. IN SPITE OF THE FACT THAT THE FOUR CAPSULES WERE LOCATED IN PHYSICALLY IDENTICAL POSITIONS ABOUT THE FUEL CORE, THEY WERE SUBJECT TO WIDELY DIFFERENT NEUTRON EXPOSURES (>1 MEV). THE CHARPY-V TRANSITION TEMPERATURE INCREASE OF THE YANKEE PRESSURE VESSEL STEEL, WHICH WAS IRRADIATED TOGETHER WITH A REFERENCE STEEL OF THE SAME NOMINAL COMPOSITION IN THE SAME CAPSULES, WAS SOMEWHAT LARGER THAN THE INCREASE OF THE REFERENCE STEEL. THE DATA FROM THE REFERENCE STEEL FOLLOWED CLOSELY THE TREND LINE OF TRANSITION TEMPERATURE INCREASE VERSUS TOTAL NEUTRON EXPOSURE PREVIOUSLY ESTABLISHED BY NRL FOR 540F IRRADIATIONS, BUT THAT FOR THE YANKEE VESSEL STEEL WAS DISPLACED ALMOST 100F HIGHER THAN THE REFERENCE STEEL. POSTIRRADIATION ANNEALING WAS BENEFICIAL FOR THE THREE HEAT TREATMENT CONDITIONS STUDIED, AND, IN ONE CASE, ESSENTIALLY COMPLETE RECOVERY OF INITIAL PROPERTIES WAS OBSERVED. THE STUDY DEMONSTRATED THE USEFULNESS OF ACCURATE DOSIMETRY DATA FOR EACH SURVELLANCE SPECIMEN AND THE IMPORTANCE OF MEASUREMENTS OF THE NEUTRON DOSAGE TO WHICH THE MONITORED REACTOR COMPONENT IS EXPOSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-609 708
NAVAL RESEARCH LAB WASHINGTON D C

A NAVY ANALYSIS OF GLASS REINFORCED PLASTICS FOR HYDROSPACE APPLICATIONS, (U)

NOV 64 39P KIES,J. A. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT NORTHEASTERN STATES NAVY RESEARCH AND DEVELOPMENT CLINIC, PHILADELPHIA, PA. NOV. 19, 1964.

DESCRIPTORS: (*GLASS TEXTILES, REINFORCING MATERIALS), (*PLASTICS, FILAMENT WOUND CONSTRUCTION), (*PRESSURE VESSELS, COMPOSITE MATERIALS), (*COMPOSITE MATERIALS, PRESSURE VESSELS); (*FILAMENT WOUND CONSTRUCTION, PRESSURE VESSELS); FIBERS, FATIGUE (MECHANICS), TENSILE PROPERTIES, FRACTURE (MECHANICS), SHEAR STRESSES, MOISTURE, POROSITY, BUBBLES, REVIEWS (U)
IDENTIFIERS: DEEP-SUBMERGENCE VESSELS (U)

RECENT ADVANCES AND REMAINING PROBLEMS IN THE STUDY OF FILAMENT-WOUND GLASS REINFORCING PLASTICS ARE REVIEWED. AREAS CONSIDERED ARE FATIGUE STUDIES, SHEAR AND TENSILE CRACKING, EQUAL TENSIONING OF FIBERS, PORT REINFORCEMENT, LAY-UP PATTERNS, MOISTURE EFFECTS, FIBER PROPERTIES, MECHANICAL DAMAGE, AND EFFECTS OF POROSITY OR BUBBLES IN THE RESIN. EMPHASIS IS GIVEN TO APPLICATION TO SHELLS FOR MANNED DEEP SUBMERGENCE VEHICLES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-610 081
BUDD CO PHILADELPHIA PA

MANUFACTURE AND HYDROTEST OF THREE 20 INCH DIAMETER MAR-AGING STEEL PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. FOR 16 MAY 63-16 OCT 64,
OCT 64 52P HAUCK,W. J. I
CONTRACT: DA36 034ORD3296
PROJ: OMS5010 1180800 51 03

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, MARAGING STEELS), (*MARAGING STEELS, PRESSURE VESSELS), NICKEL ALLOYS, TITANIUM ALLOYS, MOLYBDENUM ALLOYS, CARBON ALLOYS, WELDING, HEAT TREATMENT, AGING (MATERIALS), DEFORMATION, TENSILE PROPERTIES, ROCKET CASES, CYLINDRICAL BODIES, FRACTURE (MECHANICS) (U)
IDENTIFIERS: MARAGING STEELS 18NI (U)

THE FABRICATION OF THREE PRESSURE VESSELS AND THE HYDROTEST OF TWO CONFIRMS THE VALIDITY OF THE DESIGN CONCEPT AND THE MATERIAL SELECTED. THE USE OF 18% NICKEL MAR AGING STEEL STRIP AT A YIELD STRENGTH APPROACHING 300,000 PSI IS POSSIBLE IN A ROCKET CASE. TEST RESULTS INDICATE THAT THE PROCESSING TECHNIQUES ARE PRACTICAL AND THAT CONSISTENCY CAN BE OBTAINED. SIMPLICITY OF FABRICATION AND HEAT TREATMENT SHOULD BE A FAVORABLE ECONOMIC RESULT EVEN THOUGH THE BASIC MATERIAL COST OF THE MAR-AGING STEEL IS SOMEWHAT HIGHER THAN THE LOWER ALLOY STEELS CURRENTLY USED IN ROCKET MOTORS. IT IS BELIEVED THAT UTILIZING THE FULL PROPERTIES AVAILABLE IN THE MAR-AGING STEEL AND THE PROCESSING TECHNIQUES DEVELOPED, THAT TENSILE STRENGTHS SUBSTANTIALLY IN EXCESS OF 300,000 PSI ARE FEASIBLE FOR METAL ROCKET CASES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-611 782
ARIZONA UNIV TUCSON

THE DESIGN OF RESEARCH APPARATUS FOR CONSTANT-VOLUME COMBUSTION PROCESSES. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
64 66P ANDERSON,EVERETT E. ;
CONTRACT: AF33 608 1038

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMBUSTION CHAMBERS, DESIGN), (*LABORATORY EQUIPMENT, COMBUSTION), (*PRESSURE VESSELS, COMBUSTION CHAMBERS), CONTROL, TEMPERATURE, PRESSURE, IGNITION, WATER VAPOR, FLAME PROPAGATION, SAFETY, STEEL, GLASS, IGNITERS, PHOTOGRAPHIC RECORDING SYSTEMS, MATHEMATICAL ANALYSIS, STRESSES, SPHERES (U)

A DESIGN FOR THE CONSTRUCTION AND SELECTION OF APPARATUS FOR CONSTANT-VOLUME COMBUSTION PROCESSES RESEARCH IS PRESENTED. A DISCUSSION OF THE DESIGN CRITERIA AND CALCULATIONS WITH REGARD TO TEMPERATURE, PRESSURE, MATERIAL, ETC., IS MADE. COMPLETE ENGINEERING DRAWINGS AND MATERIAL LISTINGS ARE INCLUDED IN ORDER THAT THIS PAPER MAY BE USED IN THE ACTUAL CONSTRUCTION OF A CONSTANT-VOLUME SPHERICAL BOMB AND SELECTION OF THE ASSOCIATED EQUIPMENT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-612 872
SOUTHWEST RESEARCH INST SAN ANTONIO TEX

EXPERIMENTAL STRESS ANALYSIS OF A ONE-SIXTH SCALE MODEL OF AN ANECHOIC PRESSURE VESSEL. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
MAY 64 40P SCHMIDT,W. R. ;PICKETT,A. G. ;
CONTRACT: NONR370400
PROJ: 03 1178

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ANECHOIC CHAMBERS, MODEL TESTS), (*STRESSES, MATHEMATICAL ANALYSIS), (*PRESSURE VESSELS, ANECHOIC CHAMBERS), MODEL TESTS, SPHERES, EXPERIMENTAL DATA, DESIGN (U)

AN EXPERIMENTAL STRESS ANALYSIS WAS MADE TO CONFIRM THE DESIGN FEASIBILITY OF A DOUBLE WALL 40-FOOT DIAMETER SPHERICAL PRESSURE VESSEL TO BE USED AS AN ANECHOIC CHAMBER. ELECTRICAL RESISTANCE STRAIN GAGES WERE USED TO MEASURE STRAINS ON THE SURFACE OF THE TEST ARTICLE; A ONE-SIXTH SCALE MODEL OF THE ANECHOIC VESSEL, FOR SEVERAL POSSIBLE COMBINATIONS OF INTERNAL PRESSURE, ANNULUS PRESSURE AND DEAD WEIGHT LOADS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-613 552
NAVAL RESEARCH LAB WASHINGTON D C

TENSILE STRESSES ON THE SURFACE OF AN ELLIPSOIDAL CAVITY IN COMPRESSIVE LOADING SITUATIONS, (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
MAR 65 13P MULVILLE,D. R. ;KIES,J. A. ;
REPT. NO. NRL-6210
PROJ: WW041

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, COMPRESSIVE PROPERTIES), BRITTLENESS, SOLIDS, BUBBLES, ELLIPSOIDS, TENSILE PROPERTIES, STRESSES, HYDROSTATIC PRESSURE, FAILURE (MECHANICS), SUBMARINE HULLS (U)

THE STRESSES ON THE WALLS OF EMBEDDED CAVITIES HAVE BEEN INVESTIGATED, PARTICULARLY FOR COMPRESSIVE LOADING SITUATIONS CORRESPONDING TO THOSE FOR SHELLS FOR DEEP SUBMERGENCE. THE DISCREPANCY BETWEEN THEORETICAL AND MEASURED COMPRESSIVE STRENGTH OF BRITTLE SOLIDS IS ONE MOTIVATING FACTOR FOR EXTENDING THIS INVESTIGATION. THE MAXIMUM TENSILE STRESS COMPONENTS ARE EQUAL NUMERICALLY TO THE APPLIED COMPRESSIVE STRESS. THE MAXIMUM TENSILE STRESSES DEPEND ON THE SHAPE OF THE CAVITY, POISSON'S RATIO, AND THE ORIENTATION OF THE CAVITY IN THE SHELL. IT IS RECOMMENDED THAT THE WORK CONTINUE WITH THE AIM OF SHOWING THE EFFECTS OF CAVITIES ON STRENGTH. ONE APPROACH RECOMMENDED IS TO CALCULATE THE EFFECTS OF CRACKS IN THE WALLS OF THE CAVITIES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-614 591
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF ENGINEERING MECHANICS

CASCADE ARRANGEMENT IN SPHERICAL PRESSURE VESSEL DESIGN FOR NUCLEAR POWER REACTORS, (U)

JAN 65 29P HU,L. W. ;SCHUTZLER,J. C. ;
CONTRACT: AF AFOSR127 64
MONITOR: AFOSR , 65-0315

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, CASCADE STRUCTURES), (*PRESSURIZED WATER REACTORS, PRESSURE VESSELS), STRESSES, SPHERES, REACTOR COOLANTS, NUMERICAL ANALYSIS (U)

A CASCADE ARRANGEMENT OF PRESSURE VESSELS IS SUGGESTED FOR NUCLEAR POWER REACTOR DESIGN. THE STRESS ANALYSIS AND A PROCEDURE FOR THE MINIMUM WEIGHT DESIGN OF CASCADE SPHERICAL SHELLS ARE PRESENTED. A NUMERICAL EXAMPLE OF TWO STAGE SPHERICAL SHELLS IS GIVEN TO DEMONSTRATE THE PROCEDURES DEVELOPED AS WELL AS THE NEED OF SUCH PRESSURE VESSELS IN NUCLEAR POWER REACTOR DESIGN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-615 022
FRANKFORD ARSENAL PHILADELPHIA PA

FRACTURE TOUGHNESS AND PRESSURE VESSEL PERFORMANCE. (U)

AUG 63 12P CARMAN,CARL M. ;ARMIENTO, DOMENIC F. ;MARKUS,HAROLD ;
REPT. NO. A63-24
PROJ: 1H024401A111

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. PREPARED FOR PRESENTATION AT THE WINTER ANNUAL MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERING, PHILADELPHIA, PA., 17-22 NOV 63. ASME PAPER NO. 63-WA-138 PUB. IN JOURNAL OF BASIC ENGINEERING P1-7 1963 (COPIES NOT AVAILABLE TO DDC OR CLEARINGHOUSE CUSTOMERS).

DESCRIPTORS: (*PRESSURE VESSELS, FRACTURE (MECHANICS)), (*FRACTURE (MECHANICS), PRESSURE VESSELS), METALLOGRAPHY, IRON ALLOYS, TOUGHNESS, FATIGUE (MECHANICS), FAILURE (MECHANICS), STRESSES, STRAIN (MECHANICS), FRACTOGRAPHY (U)

CRITERIA FOR PREDICTING PRESSURE VESSEL PERFORMANCE BASED ON FRACTURE TOUGHNESS ARE REVIEWED IN GENERAL TERMS. EXPERIMENTAL STUDIES OF SMALL PRESSURE VESSELS FABRICATED OF HIGH TOUGHNESS, HIGH STRENGTH STEEL 4330V (MOD + SI) ARE DESCRIBED. DATA PRESENTED INCLUDE FATIGUE LIFE IN PRESENCE OF A SMALL PART-THROUGH-CRACK AND BURST PROPERTIES OF THE FATIGUE CRACKED CYLINDERS. INTERPRETATION OF THE FATIGUE DATA IS BASED ON PARIS' RELATIONSHIP DA/DN = K TO 4TH POWER/M. THE FAILURE STRESSES ARE DISCUSSED IN RELATION TO THE STRESS ELEVATING EFFECT OF LOCAL BULGING ON THE APPARENT FRACTURE TOUGHNESS. THE BEHAVIOR OBSERVED IN TESTING FULL SCALE HIGH STRENGTH PRESSURE VESSELS FABRICATED FROM MATERIALS HAVING INTERMEDIATE FRACTURE TOUGHNESS, NAMELY, D6A STEEL AT 200,000-PSI YIELD STRENGTH AND 300M STEEL AT 230,000-PSI YIELD STRENGTH AND MATERIALS HAVING LIMITED FRACTURE TOUGHNESS, NAMELY, TWENTY PERCENT NICKEL MARAGING STEEL AT 280,000-PSI YIELD STRENGTH, ARE DISCUSSED IN RELATION TO THE RATIO OF FRACTURE TOUGHNESS TO PLANE-STRAIN FRACTURE TOUGHNESS BASED ON THE PART-THROUGH-CRACK MODEL. PRECAUTIONS NECESSARY FOR FABRICATION AND INSPECTION TO INSURE RELIABLE PERFORMANCE ARE DISCUSSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-615 415
ALLIED RESEARCH ASSOCIATES INC CONCORD MASS

PHOTOELASTIC INVESTIGATION OF STRESSES IN A PENETRATED HEMISPHERE. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
DEC 64 35P HAMILTON,HAROLD ;BECKER,
HERBERT ;
REPT. NO. ARA-F-271-5
CONTRACT: NOBS90363

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PHOTOELASTICITY, PRESSURE VESSELS), (*PRESSURE VESSELS, STRESSES), (*STRESSES, MATHEMATICAL ANALYSIS), HEMISPHERICAL SHELLS, PLASTICS, LOAD DISTRIBUTION, FRICTION, SURFACE PROPERTIES, PENETRATION, MODEL TESTS, STEEL, SPHERES, PRESSURE, ACRYLIC RESINS, EPOXY PLASTICS, POLARISCOPES (U)

A PHOTOELASTIC STUDY WAS MADE TO DETERMINE THE INFLUENCE OF SEAT CONDITIONS ON THE STRESS DISTRIBUTION IN A REPRESENTATIVE PLASTIC WINDOW OF A BATHYSCAPH PRESSURE VESSEL. FRICTION MEASUREMENTS WERE MADE FOR COMPARISON OF MATERIALS AND SURFACE FINISHES. TWODIMENSIONAL TESTS ESTABLISHED THE GENERAL CHARACTER OF THE STRESS DISTRIBUTIONS IN THE WINDOW, AND THREEDIMENSIONAL TESTS REVEALED THE STRESSES IN A SCALE MODEL OF THE PROTOTYPE. IT WAS FOUND THAT THE THREEDIMENSIONAL STRESS DISTRIBUTION IN THE REGION OF THE INNER FACE OF A PLASTIC WINDOW, WHEN TESTED IN A STEEL SPHERE AND LOADED UNDER EXTERNAL PRESSURE, WAS SIMILAR TO STRESSES IN THE TWO-DIMENSIONAL MODELS IN THAT SAME REGION. THE RATIO OF MAXIMUM STRESS TO APPLIED PRESSURE WAS FOUND TO BE 0.85 IN THE THREE-DIMENSIONAL WINDOW MODEL, WHICH WOULD ALSO PERTAIN TO THE PROTOTYPE. THIS REPORT INCLUDES A RECAPITULATION OF THE DATA OBTAINED ON PREVIOUS STUDIES OF THE STRUCTURAL BEHAVIOR OF EXTERNALLY PRESSURIZED SPHERICAL VESSELS WITH WINDOW AND HATCH PENETRATIONS. THE REMAINING WINDOW PROBLEMS ARE IDENTIFIED AND DISCUSSED, AND RECOMMENDATIONS ARE MADE FOR FUTURE PROJECTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-617 890
ILLINOIS UNIV URBANA DEPT OF THEORETICAL AND APPLIED MECHANICS

PHOTOELASTIC STUDY OF THE STRESSES NEAR OPENINGS IN PRESSURE VESSELS, (U)

MAR 65 101P TAYLOR,C. E. ILIND,N. C. ;
REPT. NO. T/AM-270
CONTRACT: NOBS72069 ,NOBS86112

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PHOTOELASTICITY, PRESSURE VESSELS), (*PRESSURE VESSELS, STRESSES), (*STRESSES, PRESSURE VESSELS), MODEL TESTS, EXPERIMENTAL DATA, MATHEMATICAL ANALYSIS, LOAD DISTRIBUTION, NOZZLES, TEST METHODS, STRUCTURES, SPHERES, CYLINDRICAL BODIES, STRUCTURAL SHELLS, SURFACE PROPERTIES (U)

THE REPORT DESCRIBES THE EXPERIMENTAL TECHNIQUES USED IN THE STUDY, PRESENTS THE RESULTS, AND DISCUSSES THE PROBABLE ACCURACY. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-617 902
NAVAL APPLIED SCIENCE LAB BROOKLYN N Y

DEVELOPMENT OF WELDING TECHNIQUES FOR FABRICATING A THICK PLATE TITANIUM PRESSURE BOX. (U)

DESCRIPTIVE NOTE: TECHNICAL MEMO.
64 17P
REPT. NO. 6377-4 ,TM-7
PROJ: SF013 01 03 ,SR007 01 02
TASK: 0216 ,0704

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TITANIUM ALLOYS, WELDING), (*WELDING, TITANIUM ALLOYS), (*PRESSURE VESSELS, TITANIUM ALLOYS), TITANIUM, METAL PLATES, THICKNESS, WELDS, CONTAINERS, SURFACE PROPERTIES, CONTAMINATION, TESTS, HYDROSTATIC PRESSURE, ALUMINUM ALLOYS, VANADIUM ALLOYS (U)
IDENTIFIERS: TITANIUM ALLOY 6 AL 4 V (U)

SUITABLE OUT-OF-CHAMBER, MANUAL AND SEMI-AUTOMATIC WELDING TECHNIQUES HAVE BEEN DEVELOPED FOR THE FABRICATION OF A TITANIUM ALLOY PRESSURE BOX OF THE TYPE REQUIRED FOR LOW CYCLE FATIGUE STUDIES AT THE MARINE ENGINEERING LABORATORY. THESE TECHNIQUES MAY ALSO BE USED FOR FABRICATING COMPLEX STRUCTURAL ELEMENTS OF HEAVY PLATE TITANIUM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-621 281
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE MARSEILLE (FRANCE)

PRESSURE CHAMBER FOR MICROELECTROPHYSIOLOGICAL TECHNIQUES (CAISSON DE COMPRESSION POUR TECHNIQUES MICROELECTROPHYSIOLOGIQUES), (U)

OCT 64 13P CHAGNEUX,ROGER ;
CONTRACT: AF-EOAR-114-63, PHS-NB-03337
PROJ: AF-9777
TASK: 97770
MONITOR: AFOSR , 65-1294

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN BULL INST OCEANOGR MONACO V61 N1287 P1-8 1964 (COPIES AVAILABLE ONLY TO DDC USERS). TEXT IN FRENCH WITH SUMMARY IN ENGLISH.

DESCRIPTORS: (*PRESSURE VESSELS, LABORATORY EQUIPMENT), (*BIOLOGICAL LABORATORIES, PRESSURE VESSELS), PRESSURE, REMOTE CONTROL SYSTEMS, HIGH-PRESSURE RESEARCH, GASES, NERVE CELLS, NERVOUS SYSTEM, PHYSIOLOGY, MARINE BIOLOGY (U)
IDENTIFIERS: ELECTROPHYSIOLOGY (U)

THIS RESEARCH PROGRAM ON THE EFFECT OF HYPERBAR GASES ON ISOLATED NERVE CELLS OF 'APLYSIA' HAS INVOLVED THE STUDY AND CONSTRUCTION OF A PRESSURE CHAMBER. THE CHAMBER IS MAINLY COMPOSED OF A CYLINDRICAL TUBE, WITH 2 GLASS PORTHOLES ALLOWING THE ILLUMINATION AND OBSERVATION OF THE BIOLOGICAL PREPARATIONS, AND 2 MOVEABLE DOORS WITH A QUICKCLOSING SYSTEM WHICH PERMIT MICROMANIPULATION. ELECTRICAL CONNECTIONS ASSURE ALL THE VARIOUS REMOTE CONTROLS. TWO TAPS, PURGE AND STOP, A MANOMETER AND A SAFETY VALVE COMPLETE THE EQUIPMENT OF THE CHAMBER. THE EQUIPMENT MEETS THE REQUIREMENTS OF MICROELECTROPHYSIOLOGICAL TECHNIQUES AND CAN SUBMIT THE PREPARATIONS TO CONSTANT PRESSURES OF AS MUCH AS 6 BARS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-621 911
DIRECTORATE OF SCIENTIFIC INFORMATION SERVICES OTTAWA (ONTARIO)

REPAIRING THICK-WALLED HIGH-PRESSURE VESSELS BY ELECTRIC ARC WELDING, (U)

DEC 64 7P FARBER,G. KH. ;NIKITIN,D. G.
;
REPT. NO. T-418-R
MONITOR: TT , 65-40732

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF KHIMICHESKOE MASHINOSTROENIE (USSR) V5 N4 P29-32 1963. ALSO AVAILABLE FROM NRC AS C-5161.

DESCRIPTORS: (*ARC WELDING, PRESSURE VESSELS), (*PRESSURE VESSELS, ARC WELDING), (*STEEL, ARC WELDING), USSR, MAINTENANCE, THICKNESS, CHROMIUM ALLOYS, NICKEL ALLOYS, MOLYBDENUM ALLOYS, HEAT EXCHANGERS, WELDING RODS (U)

A WELDING TECHNIQUE IS DESCRIBED FOR WELD BUILD-UP OF DAMAGED AREAS IN THICK-WALLED VESSELS AND TO RESTORE REACTION COLUMNS AND HEAT EXCHANGERS. THREE COLUMNS AND A HEAT-EXCHANGER WERE KEPT UNDER OBSERVATION DURING ONE OPERATING YEAR. THE EQUIPMENT WORKED AT A PRESSURE OF 280-300 ATMOSPHERES AND A TEMPERATURE OF 350-390C INSIDE THE REACTION COLUMNS AND 200-350C IN THE HEATEXCHANGERS. ACCORDING TO THE READINGS OF SURFACE THERMOCOUPLES THE TEMPERATURE OF THE OUTER WALLS OF THE APPARATUS FLUCTUATED WITHIN THE LIMITS 160-220C. ONLY IN SOME UNITS WAS THERE OBSERVED A LOCAL OVERHEATING TO TEMPERATURES 250-300C. VISUAL EXAMINATIONS SHOWED THAT NO VISIBLE DEFECTS WHATEVER HAD DEVELOPED IN THE REPAIRED AREAS ON THE VESSEL WALLS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-623 166
NAVY ELECTRONICS LAB SAN DIEGO CALIF

PRESSURE VESSEL FOR CALIBRATING SONAR TRANSDUCERS.
ACOUSTICALLY TRANSPARENT FIBER GLASS CAPSULE PERMITS
TESTING AT PRESSURES TO 800 PSIG. (U)

DESCRIPTIVE NOTE: RESEARCH AND DEVELOPMENT REPT. FOR OCT
64-MAR 65,
JUL 65 21P GREEN,C. E. I
REPT. NO. NEL-1301
PROJ: SF101 03 18
TASK: 8049

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, TEST FACILITIES),
(*GLASS TEXTILES, PRESSURE VESSELS), (*SONAR
EQUIPMENT, CALIBRATION), (*TRANSDUCERS, SONAR
EQUIPMENT), PRESSURE, ACOUSTIC EQUIPMENT, SOUND
TRANSMISSION, HIGH-PRESSURE RESEARCH, ACOUSTIC
IMPEDANCE (U)

ACOUSTICALLY TRANSPARENT VESSEL HOUSES A SINGLE
TRANSDUCER FOR TESTING UNDER PRESSURE TO 800 PSIG.
TESTS OF B24FA TRANSDUCER INDICATE MARKED
DIFFERENCE IN TRANSMITTING RESPONSE AT DEPTH.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-625 950 14/2 8/10 13/8
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

THE CONVERSION OF 16-INCH PROJECTILES TO PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: TECHNICAL NOTE,
JUN 65 67P GRAY,K. O. ;STACHIW,J. D. ;
REPT. NO. NCEL-TN-755
PROJ: Y-F-015-01-07-001

UNCLASSIFIED REPORT

DESCRIPTORS: (*PROJECTILES, PRESSURE VESSELS), (*PRESSURE VESSELS, UNDERWATER EQUIPMENT), DESIGN, MANUFACTURING METHODS, PROCESSING, TESTING, OCEANOGRAPHIC EQUIPMENT, SEALS(STOPPERS), MECHANICAL DRAWING, DEEP SUBMERGENCE (U)

PRESSURE VESSELS FOR USE WITH FRESH WATER AND SEA WATER AT PRESSURES UP TO 20,000 PSI HAVE BEEN FABRICATED FROM MODIFIED 16-INCH HIGH CAPACITY NAVAL PROJECTILES. DETAILS FOR MODIFICATION OF PROJECTILES AND THE FABRICATION OF SUPPORTING EQUIPMENT ARE PRESENTED. PROOF TESTING PROCEDURE AND DATA ARE DESCRIBED AND DISCUSSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-628 877 13/8 13/4
GIBBS LAB YALE UNIV NEW HAVEN CONN

TECHNIQUE FOR FORMING PRESSURE WINDOWS FROM THIN METAL SHEETS. (U)

DESCRIPTIVE NOTE: REVISED ED.,
SEP 65 2P CLELAND,W. E. ;PREPOST,R. ;

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN REVIEW OF SCIENTIFIC INSTRUMENTS V36 N12 P1881-3 1965. COPIES TO DDC USERS ONLY.
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT RECEIVED 15 MAR 65. PREPARED IN COOPERATION WITH HIGH ENERGY PHYSICS LAB., STANFORD UNIV., CALIF., REPT. NO. HEPL-427. RESEARCH SUPPORTED IN PART BY AFOSR, ARPA AND NONR.

DESCRIPTORS: (*PRESSURE VESSELS, DIAPHRAMS(MECHANICS)), (*DIAPHRAMS(MECHANICS), SHEETS), (*MATERIAL FORMING, DIAPHRAMS(MECHANICAL)), ALUMINUM ALLOYS, STAINLESS STEEL, THICKNESS, FRACTURE(MECHANICS) (U)

REPRINT: TECHNIQUE FOR FORMING PRESSURE WINDOWS FROM THIN METAL SHEETS.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-629 881 18/10 18/9
NAVAL RESEARCH LAB WASHINGTON D C

RADIATION DAMAGE SURVEILLANCE OF POWER REACTOR PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
JAN 66 23P SERPAN,C. Z. ,JR.;STEELE,I. E. ;HAWTHORNE,J. R. ;
REPT. NO. NRL-6349,
CONTRACT: AT(49-5)-2110,
PROJ: RR-007-01-46-5409 ,SR-007-01-01
TASK: 0858,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*RADIATION DAMAGE, PRESSURE VESSELS), (*PRESSURE VESSELS, RADIATION DAMAGE), (*POWER REACTORS, PRESSURE VESSELS), NEUTRON FLUX, LIFE EXPECTANCY, TRANSITION TEMPERATURE, NUCLEAR POWER PLANTS, MECHANICAL PROPERTIES, REACTOR SAFETY SYSTEMS, REACTOR SYSTEM COMPONENTS (U)

THE DELETERIOUS EFFECT OF HIGH ENERGY NEUTRONS UPON THE MECHANICAL PROPERTIES OF REACTOR PRESSURE VESSEL STEELS HAS PROMPTED THE EMPLOYMENT OF MATERIAL SURVEILLANCE PROGRAMS IN MANY NUCLEAR POWER PLANTS. THESE PROGRAMS PROVIDE FOR THE EXPOSURE OF TEST SPECIMENS REPRESENTATIVE OF THE REACTOR PRESSURE VESSEL AT IN-REACTOR LOCATIONS, WHEREIN THEY WILL EXPERIENCE THE SAME THERMAL AND RADIATION DAMAGE HISTORY AS THE VESSEL ITSELF. EVALUATION OF THESE SPECIMENS, WHICH REVEALS THE PROGRESSIVE CHANGES IN THE MECHANICAL PROPERTIES OF THE VESSEL, PROVIDES A BASIS UPON WHICH OPERATIONAL PROCEDURES AND MAXIMUM LIFETIME EXPOSURE MAY BE FORMULATED FOR THE PLANT. A REVIEW AND AN ANALYSIS OF SEVERAL INSTANCES OF SHORTCOMINGS IN SURVEILLANCE PROGRAMS ARE PRESENTED ALONG WITH A SET OF RECOMMENDATIONS FOR CONSIDERATION IN PLANNING NEW SURVEILLANCE PROGRAMS. IN UTILIZING THESE RECOMMENDATIONS, PRESSURE VESSEL SURVEILLANCE PROGRAMS CAN BE MADE TO PROVIDE VALUABLE INFORMATION FOR USE IN DETERMINING PLANT OPERATIONS; AT THE SAME TIME RESULTS FROM THESE PROGRAMS MAY ADD TO THE GENERAL KNOWLEDGE OF RADIATION EFFECTS IN PRESSURE VESSEL STEELS OR OTHER MATERIALS SUBJECT TO RADIATION. RECOGNITION OF THE VALUE OF SURVEILLANCE PROGRAMS AND THEIR CONSCIENTIOUS APPLICATION SHOULD FURTHER THE PUBLIC ACCEPTANCE OF NUCLEAR REACTORS AS SAFE ALTERNATIVE POWER SYSTEMS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-631 443 16/4.2 21/8.1
BENDIX MISHAWAKA DIV BENDIX CORP IND

DEVELOPMENT OF A HERMETIC SEALED NITROGEN STORAGE SYSTEM FOR THE TALOS RIM-8E FUEL PRESSURIZATION SYSTEM. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
FEB 66 67P CLAXTON,W. B. ;
REPT. NO. BXM-5930,
CONTRACT: NOW-65-0289

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*GUIDED MISSILE COMPONENTS, PRESSURE VESSELS), (*FUEL SYSTEMS, *PRESSURE VESSELS), (*TANKS(CONTAINERS), FUEL SYSTEMS), NITROGEN, STORAGE, GUIDED MISSILES(SURFACE-TO-AIR), SHIPBORNE, HERMETIC SEALS, RELEASE MECHANISMS, VALVES, EXPLOSIVES INITIATORS, PRESSURE GAGES (U)
IDENTIFIERS: FUEL PRESSURIZATION SYSTEMS, TALOS (U)

THE REPORT DESCRIBES A METHOD USED TO PROVIDE A 2150 PSI NITROGEN STORAGE SYSTEM THAT RETAINS OPERATIONAL PRESSURE FOR A MINIMUM PERIOD OF THREE YEARS WITHOUT INTERIM SERVICING. A HERMETIC TANK SEAL AND A SQUIB OPERATED RELEASE MECHANISM WERE DEVELOPED FOR THIS PURPOSE. THE RELEASE MECHANISM UTILIZES A NOTCHED RELEASE TUBE THAT, WHEN IMPACTED BY A SQUIB OPERATED PISTON, RUPTURES PROVIDING A CONTAMINATION FREE PATH TO A PRESSURE REGULATOR. EMPHASIS WAS GIVEN TO METHODS THAT WOULD PERMIT RETROFIT OF AN EXISTING STORAGE SYSTEM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-632 092 13/4
UNITED STATES RUBBER CO MISHAWAKA IND

LINERS FOR HIGH PRESSURE AIR STORAGE VESSELS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 5, 1 JAN-1 APR 66,
APR 66 37P UHLIG,E. C. ;FALKENAU,V. A. ;KOHRN,R. C. ;
CONTRACT: NOBS-92150,
PROJ: SR-007-03-04,
TASK: 1008,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*FILAMENT WOUND CONSTRUCTION, *STORAGE TANKS), (*PRESSURE VESSELS, STORAGE TANKS), AIR, LAMINATES, FEASIBILITY STUDIES (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-636 385 13/8 13/5 13/1
INTERNATIONAL INST OF WELDING

COMMISSION XII PRESSURE VESSELS, BOILERS AND PIPE LINES. (U)

DESCRIPTIVE NOTE: ANNUAL REPT.
JUL 65 10P

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*WELDING, SYMPOSIA), (*PRESSURE VESSELS, WELDING), (*BOILERS, WELDING), (*PIPES, WELDING), WELDS, STRESSES, STEEL, HEAT TREATMENT, NON-DESTRUCTIVE TESTING (U)

ANNUAL REPORT OF COMMISSION XI CONCERNING WELDING OF PRESSURE VESSELS, BOILERS, AND PIPE LINES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-636 963 13/4 13/7 14/2 11/6
AUBURN RESEARCH FOUNDATION ALA

MECHANISMS OF METALLIC FAILURE: FLAW INITIATION TECHNIQUES AND MEASUREMENTS IN THIN-WALL PRESSURE VESSELS. (U)

JUN 66 27P MAYNOR,HAL W. ; JR. ;
BUSCH,COURTNEY C. ;
REPT. NO. 5,
CONTRACT: DA-01-021-AMC-12521(Z),

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: AN INSTRUMENTED HYDRAULIC SYSTEM FOR THE INTRODUCTION OF CRACKS TO AND BURST TESTING OF HIGH-STRENGTH STEEL PRESSURE VESSELS.

DESCRIPTORS: (*PRESSURE VESSELS, *FRACTURE(MECHANICS)), (*HYDRAULIC SYSTEMS, TEST EQUIPMENT), RUPTURE, MARAGING STEELS, NICKEL ALLOYS, FAILURE(MECHANICS), MODEL TESTS, TOUGHNESS, STEEL, STRESSES (U)

A HYDRAULIC SYSTEM WAS DESIGNED AND CONSTRUCTED FOR THE PURPOSE OF INTRODUCING SURFACE OR PART-THROUGH-THE-THICKNESS CRACKS TO THIN-WALL (0.065-IN.) SCALE-MODEL PRESSURE VESSELS. THE HOOP STRESSES RESULTING FROM INTERNAL PRESSURE, IN THE RANGE 4000 TO 5000 PSI, WILL BE APPLIED AS PRESSURE PULSES AT FREQUENCIES UP TO 160 CYCLES PER MINUTE FOR NUMBERS OF CYCLES REQUIRED TO GROW CRACKS OF PREDETERMINED LENGTHS. THE SYSTEM CONSISTS ESSENTIALLY OF A MOTOR-DRIVEN HYDRAULIC PUMP, VALVES, FITTINGS, TUBING AND APPROPRIATE INSTRUMENTATION. A COMPONENT OF THE SYSTEM, A MANUALLY-OPERATED HYDRAULIC PUMP, WILL AFFORD BURST PRESSURES UP TO 30,000 PSI TO TEST VESSELS CONTAINING INDUCED CRACKS. SEVERAL VESSELS WERE FABRICATED FROM 18 PER CENT NICKEL (250 GRADE) MARAGING STEEL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0M07

AD-637 013 20/11 13/4
CATHOLIC UNIV OF AMERICA WASHINGTON D C STRESS ANALYSIS LABS

DISTRIBUTION OF STRESSES IN A PRESSURIZED HOLLOW CYLINDER WITH A CIRCULAR HOLE. (U)

DESCRIPTIVE NOTE: FINAL REPT., APR 65-JUL 66.
JUL 66 37P DURELLI,A. J. ;DEL RIO,C. J. ; PARKS,V. J. ;FENG,H. ;
CONTRACT: NONR-4886(00),
PROJ: S-F013-03-02,CUA-4.142.04
TASK: 19.54,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STRESSES, *PRESSURE VESSELS), CYLINDRICAL BODIES, STRUCTURAL SHELLS, PHOTOELASTICITY, COATINGS (U)

THIS PAPER DEALS WITH AN EXPERIMENTAL DETERMINATION OF STRESSES IN A PRESSURIZED THIN HOLLOW CYLINDER WITH A CIRCULAR HOLE. BRITTLE COATING, MECHANICAL AND ELECTRICAL STRAIN GAGES AND PHOTOELASTICITY WERE USED FOR THE ANALYSIS. A COMPARISON WITH A THEORETICAL DEVELOPMENT APPLIED TO A SIMILAR CASE IS MADE. COMMENTS ON THE BEST EXPERIMENTAL PROCEDURES TO BE FOLLOWED IN THE SOLUTION OF THIS KIND OF PROBLEMS ARE MADE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-638 138 13/10 20/11
NAVAL ORDNANCE LAB WHITE OAK MD

STRESSES IN SHALLOW GLASS DOMES WITH CONSTRAINED EDGES. (U)

JUN 66 65P PROCTOR,JAMES F. ;
REPT. NO. NOLTR-66-46
PROJ: NOL-889.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, DEEP SUBMERGENCE), (*GLASS, STRESSES), STRUCTURAL SHELLS, HATCHES, LOADING(MECHANICS), STRAIN(MECHANICS) (U)

STRESS-STRAIN RELATIONS DEVELOPED FOR ROTATIONALLY SYMMETRIC BENDING AND STRETCHING OF SHALLOW SEGMENTS OF THIN SPHERICAL SHELLS ARE EXTENDED TO EVALUATE THE RESPONSE OF A GLASS DOME WITH EDGE CONSTRAINT TO A UNIFORMLY APPLIED LOAD OVER A SMALL CIRCULAR AREA AT THE APEX. THEORETICALLY DERIVED STRESS-STRAIN CURVES FOR THE CONSTRAINED-EDGE CASE ARE COMPARED WITH SIMILAR CURVES WITH EXPERIMENTAL RESULTS FROM SEVERAL STATIC TESTS. ALSO THE EFFECTS OF DEGREE OF EDGE CONSTRAINT AND LOCAD CONCENTRATION ARE DEMONSTRATED AND DISCUSSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-638 925 13/4
DOUGLAS AIRCRAFT CO INC SANTA MONICA CALIF MISSILE AND SPACE SYSTEMS DIV

STRESS ANALYSIS OF A 4-INCH DIAMETER PRESSURE VESSEL DURING A 1:1 BIAXIAL BURST TEST. (U)

JUN 66 65P MCIVER,R. W. ;
REPT. NO. DAC-59500,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, STRESSES), RUPTURE, TESTS, CYLINDRICAL BODIES (U)

THE INVESTIGATION WAS MADE TO DETERMINE THE VARIATION OF STRESS RATIO IN THE TEST SECTION OF A 4-INCH DIAMETER PRESSURE VESSEL. A 1:1 BIAXIAL TEST WAS CONDUCTED BY APPLYING A COMBINATION OF PRESSURE AND AXIAL LOAD AT AN ESSENTIALLY CONSTANT RATIO TO THE TEST CYLINDER UNTIL FAILURE. THE STRESS RATIO WAS DETERMINED AT EACH OF TWENTY-ONE LOCATIONS FROM MEASURED PRINCIPAL STRAINS. THE MAXIMUM VARIATION IN YIELD STRENGTH AT ANY OF THE NINE CENTERMOST LOCATIONS IN THE TEST SECTION WAS LESS THAN PLUS OR MINUS 1.5 PERCENT OF THEIR AVERAGE. THIS SPECIMEN CONFIGURATION IS CONSIDERED ACCEPTABLE FOR 1:1 BIAXIAL TESTS, PROVIDED THAT THE THINNEST AREA OF THE SPECIMEN IS LOCATED CLOSE TO THE AXIAL CENTER-LINE OF THE TEST SECTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-638 994 20/11
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

DETERMINATION OF STRESSES AT NON-RADIAL OPENINGS IN SPHERICAL PRESSURE VESSELS. (U)

MAR 66 35P LEVEN,M. M. ;
REPT. NO. 66-9D7-520-R1,
CONTRACT: NOBS-90132,
PROJ: SF013-06,
TASK: 4218,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE VESSELS, *STRESSES), SPHERES, EXPERIMENTAL DATA, MODEL TESTS (U)

AN ATTEMPT WAS MADE TO SIMULATE EXPERIMENTALLY THE THEORETICAL CASE OF AN OBLIQUE HOLE IN A PRESSURIZED SPHERICAL VESSEL. FOR THE CASE OF AN OPENING OF DIAMETER RATIO 0.129 AND AT 45 DEGREES TO THE RADIAL DIRECTION, SEVEN DIFFERENT CLOSURE SCHEMES WERE TRIED. THESE ARE LISTED AS WS-16B1, WS-16B1 A TO F, INCLUSIVE. RADICALLY DIFFERENT STRESSES WERE OBTAINED FOR EACH CLOSURE SCHEME, INDICATING A VERY SENSITIVE DEPENDENCE OF STRESS ON CLOSURE CONDITIONS. FOR 0 DEGREE SECTION (I.E., THE SECTION IN WHICH THE ACUTE ANGLE BETWEEN THE OPENING AND THE VESSEL IS AT THE INNER SURFACE) THE MAXIMUM STRESS VARIED FROM 2.55S TO 4.81S; S BEING THE NOMINAL STRESS IN THE SPHERICAL VESSEL. FOR THE 180 DEGREE SECTION, THE MAXIMUM STRESS VARIATION WAS FROM 3.06 TO 6.75S. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-639 160 14/2 11/6
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

ON THE METHOD OF TESTING METALS AT HIGH TEMPERATURE AND PRESSURE VALUES. (U)

JUN 66 12P GORB,M. L. ;
REPT. NO. FTD-TT-65-1887,
MONITOR: TT 66-62286

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF PRYKLADNA MEKHANIKA (USSR) V10 N6 P547-51 1964.

DESCRIPTORS: (*PRESSURE VESSELS, TEST EQUIPMENT), (*METALS, TEST METHODS), USSR, HIGH-PRESSURE RESEARCH, TEMPERATURE, MEASUREMENT, HIGH-TEMPERATURE RESEARCH, THERMOCOUPLES (U)

THE CONSTRUCTION IS DESCRIBED OF A NEW VARIANT OF CONICAL CYLINDRICAL HIGH PRESSURE CHAMBER. A METHOD IS PROPOSED FOR MEASURING TEMPERATURES IN THE HIGH PRESSURE CHAMBER, BASED ON THE PRINCIPLE OF A NATURAL THERMOCOUPLE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-640 919 18/12 13/4
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF ENGINEERING MECHANICS

CASCADE ARRANGEMENT IN SPHERICAL VESSEL DESIGN FOR NUCLEAR POWER REACTORS, (U)

DEC 65 11P HU,L. W. ;SCHUTZLER,J. C. ;
CONTRACT: AF-AFOSR-127-66.
PROJ: AF-9782,
TASK: 978202,
MONITOR: 66-1674

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN NUCLEAR ENGINEERING AND DESIGN V3 P412-20 1966.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH DOUGLAS AIRCRAFT CO., INC., SANTA MONICA, CALIF., MISSILE AND SPACE SYSTEMS DIV.

DESCRIPTORS: (*PRESSURE VESSELS, CASCADE STRUCTURES), (*POWER REACTORS, PRESSURE VESSELS), PRESSURIZED WATER REACTORS, DESIGN (U)

THE USE OF PRESSURE VESSELS IN CASCADE ARRANGEMENT INSTEAD OF THE CONVENTIONAL SINGLE SHELL VESSELS IS PROPOSED FOR NUCLEAR POWER REACTOR DESIGN, PARTICULARLY IN VIEW OF MEETING THE DEMAND OF INCREASING PRESSURES AND TEMPERATURES FOR PRESSURIZED-WATER REACTORS. THE STRESS ANALYSIS AND A PROCEDURE FOR THE MINIMUM WEIGHT DESIGN OF IRRADIATED CASCADE SPHERICAL SHELLS ARE PRESENTED. A NUMERICAL EXAMPLE OF TWO STAGE SPHERICAL SHELLS IS GIVEN TO DEMONSTRATE THE PROCEDURES DEVELOPED AS WELL AS THE NEED FOR SUCH TYPE OF PRESSURE VESSELS IN NUCLEAR REACTOR DESIGN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-641 283 18/10 18/12
NAVAL RESEARCH LAB WASHINGTON D C

NEUTRON SPECTRAL CONSIDERATIONS AFFECTING PROJECTED ESTIMATES OF RADIATION EMBRITTLEMENT OF THE ARMY SM-1A REACTOR PRESSURE VESSEL. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
SEP 66 31P SERPAN,C. Z. ,JR.;STEELE,L. E.
;
REPT. NO. NRL-6474,
PROJ: USA-ERG-4-66,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*EMBRITTLEMENT, STEEL), (*PRESSURE VESSELS, *PRESSURIZED WATER REACTORS), (*RADIATION DAMAGE, *STEEL), REACTOR MATERIALS, NEUTRON REACTIONS, POWER REACTORS, ARMY, ALASKA (U)
IDENTIFIERS: ARMY REACTORS(SM-1A) (U)

THE PRESSURE VESSEL OF THE ARMY SM-1A REACTOR IS LOCATED CLOSE TO THE ACTIVE CORE IN SUCH A MANNER THAT THE NEUTRON EXPOSURE IS RELATIVELY HIGH; CONSEQUENTLY, THE PRESSURE VESSEL STEEL UNDERGOES A RELATIVELY RAPID RISE IN THE DUCTILE-BRITTLE TRANSITION TEMPERATURE. THE MAXIMUM PERMISSIBLE DELTA NDT FOR THE SM-1A IS ESTABLISHED BY THE ARMY AS 340F. SINCE IT IS PHYSICALLY IMPOSSIBLE TO IRRADIATE SURVEILLANCE TEST SPECIMENS AT THE SM-1A VESSEL WALL, ONLY THE NEUTRON FLUX WAS MEASURED AT THE WALL, AND REPRESENTATIVE TEST SPECIMENS WERE IRRADIATED IN A TEST REACTOR, THE LOW INTENSITY TEST REACTOR (LITR). IN TRANSLATING THE DELTA NDT VERSUS NEUTRON EXPOSURE DATA FROM THE LITR TO THE CASE OF THE SM-1A REACTOR VESSEL WALL, THE NEUTRON SPECTRA OF THE TWO REACTORS WERE USED TO ADJUST BOTH THE SM-1A REACTOR VESSEL FLUX AND THE LITR EXPOSURE VALUES IN TERMS OF N/SQ CM < 1.0, 0.5, AND 0.183 MEV. SINCE THE DISTRIBUTION OF NEUTRONS BY ENERGY GROUPS WAS DIFFERENT WITHIN EACH REACTOR AT THE SPECIFIC LOCATION OF INTEREST, THAT IS, THE VESSEL WALL OF THE SM-1A AND AN IN-CORE LOCATION OF THE LITR, THE DAMAGING POTENTIAL OF THE SM-1A REACTOR SPECTRUM LOCATION WAS RELATED TO THAT OF THE LITR. WITH DAMAGE EQUIVALENCE ESTABLISHED BETWEEN THE TWO REACTORS, A CRITICAL NEUTRON EXPOSURE (N/SQ CM > 0.5 MEV) MAY BE PROJECTED FOR PRODUCING THE MAXIMUM DELTA NDT ON THE SM-1A REACTOR VESSEL WALL. BY RELATING (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-641 875 13/10.1 11/2 13/13
DAVID TAYLOR MODEL BASIN WASHINGTON D C STRUCTURAL MECHANICS LAB

AN EXPLORATORY STUDY OF THE FEASIBILITY OF GLASS AND CERAMIC PRESSURE VESSELS FOR NAVAL APPLICATIONS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
SEP 66 36P KIERNAN,THOMAS J. ;
REPT. NO. DTMB-2243
PROJ: S-F013-01-03
TASK: 0222

UNCLASSIFIED REPORT

DESCRIPTORS: (*SUBMARINE HULLS, DEEP SUBMERGENCE), (*PRESSURE VESSELS, CERAMIC MATERIALS), GLASS, SPHERES, ALUMINUM COMPOUNDS, OXIDES, STRUCTURAL SHELLS, MODEL TESTS, LOADING(MECHANICS), COMPRESSIVE PROPERTIES (U)

AN EXPLORATORY STUDY WAS CONDUCTED TO DETERMINE THE FEASIBILITY OF USING GLASS AND CERAMIC MATERIALS FOR DEEP-SUBMERGENCE PRESSURE HULLS. IN GENERAL, THE STUDY CONFIRMED THE POTENTIAL USE OF THESE MATERIALS IN PRESSURE HULLS CAPABLE OF WITHSTANDING PRESSURES AT THE DEEPEST PART OF THE OCEAN WITH VERY LITTLE STRUCTURAL WEIGHT. HOWEVER, THE STUDY ALSO SHOWED THAT VERY LITTLE IS KNOWN ABOUT THE BEHAVIOR OF GLASS AND CERAMIC STRUCTURES UNDER HIGH-COMPRESSIVE LOADING AND THAT A GREAT DEAL OF BASIC DATA MUST BE GENERATED BEFORE THIS POTENTIAL CAN BE ACHIEVED. THE USE OF SIMPLE SPHERES OF GLASS AND CERAMIC MATERIALS FOR PROVIDING BUOYANCY IS CONSIDERED TO BE THE MOST PROMISING NEAR-FUTURE APPLICATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-644 556 21/2 13/12
NAVAL RESEARCH LAB WASHINGTON D C

FLAMMABILITY IN UNUSUAL ATMOSPHERES. PART I. PRELIMINARY STUDIES OF MATERIALS IN HYPERBARIC ATMOSPHERES CONTAINING OXYGEN, NITROGEN, AND/OR HELIUM. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
OCT 66 28P JOHNSON,J. E. ;WOODS,F. J. ;
REPT. NO. NRL-6470
PROJ: RR-010-01-44-5850

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, *FIRE SAFETY), (*CONTROLLED ATMOSPHERES, *FLAMMABILITY), MATERIALS, TEXTILES, ELASTOMERS, LUBRICANTS, IGNITION, GASES, OXYGEN, NITROGEN, HELIUM, PRESSURE, SUBMARINE SIMULATORS, OXYGEN EQUIPMENT (U)
IDENTIFIERS: DECOMPRESSION CHAMBERS, HYPERBARIC ATMOSPHERES (U)

A STUDY OF THE FLAMMABILITY OF FABRICS AND OTHER SOLIDS UNDER UNUSUAL ATMOSPHERIC CONDITIONS WAS INITIATED. THE MOST PROFOUND EFFECT ON BOTH EASE OF IGNITION AND LINEAR BURNING RATE WAS CAUSED BY OXYGEN ENRICHMENT. FOR EXAMPLE, MANY MATERIALS WHICH DID NOT IGNITE IN 21% OXYGEN IGNITED AND BURNED READILY AT 31% OR 41% OXYGEN. WITH A GIVEN ATMOSPHERE, INCREASE IN PRESSURE WAS OFTEN EFFECTIVE IN CAUSING IGNITION WHERE NO IGNITION OCCURRED AT LOWER PRESSURES. SUBSTITUTION OF HELIUM FOR NITROGEN IN MIXTURES WITH OXYGEN HAD TWO GENERALLY SIGNIFICANT EFFECTS. HELIUM DECREASED THE TENDENCY OF A MATERIAL TO IGNITE. THIS EFFECT WAS SHOWN TO BE DUE LARGELY TO THE HIGH THERMAL CONDUCTIVITY OF HELIUM. ONCE IGNITED, BURNING RATES WERE OFTEN MUCH FASTER IN HELIUM THAN NITROGEN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-644 751 20/11
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF ENGINEERING MECHANICS

TOROIDAL-TYPE SHELLS FREE OF BENDING UNDER UNIFORM NORMAL PRESSURE, (U)

66 11P MURTHY,M. V. V. ;KIUSALAAS,J.
;
MONITOR: AROD 5102:1

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN JOURNAL OF THE FRANKLIN INSTITUTE V282 N4 P232-41 OCT 1966.

DESCRIPTORS: (*HYDROSTATIC PRESSURE, STRUCTURAL SHELLS), (*PRESSURE VESSELS, HYDROSTATIC PRESSURE), ELASTIC SHELLS, BENDING, STRESSES, HEMISPHERICAL SHELLS, GEOMETRIC FORMS, INTEGRALS (U)

THE LINEAR MEMBRANE SOLUTION IS KNOWN TO BE INADMISSIBLE IN THE CASE OF A TOROIDAL SHELL OF CIRCULAR CROSS-SECTION UNDER UNIFORM HYDROSTATIC PRESSURE, AS IT LEADS TO A SERIOUS VIOLATION OF THE COMPATIBILITY CONDITION. THIS PAPER SHOWS THAT THE COMPATIBILITY CAN BE RESTORED BY A SLIGHT CHANGE IN THE MERIDIAN OF THE SHELL, RATHER THAN BY RESORTING TO BENDING OR NON-LINEAR MEMBRANE THEORIES. EXACT SOLUTIONS, WITHIN THE LINEAR SHELL THEORY, ARE GIVEN FOR THE SHAPE OF THE MERIDIAN, STRESSES AND DISPLACEMENTS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-645 787 13/8 13/4
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

NEW METHOD OF PRODUCTION OF CLAD PLATE ROLLED PRODUCTS FOR PRESSURE VESSELS. (U)

JUL 66 54P LUTSYUK-KHUDIN,V. A. ;
REPT. NO. FTD-MT-65-468
MONITOR: TT 67-60484

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MANCHINE TRANS. OF MONO. NOVYI SPOSOB PROIZVODSTVA TOLSTOLISTOVOGO DVUKHSLOINOGO PROKATA DLYA SOSUDOV VYSOKOGO DAVLENIYA, KIEV, 1965 61P.

DESCRIPTORS: (*ROLLING(METALLURGY), CLADDING), (*PRESSURE VESSELS, WELDING), (*STEEL, *CLADDING), USSR, METAL PLATES, HEAT TREATMENT, MANUFACTURING METHODS (U)

CONTENTS: MANUFACTURE OF CLAD STEELS BY METHOD OF LINING WITH SUBSEQUENT ROLLING; MANUFACTURE OF CLAD STEELS BY PACK METHOD; MANUFACTURE OF PLATE ROLLED STOCK WITH APPLICATION OF ELECTROSLAG WELDING; TECHNOLOGY OF ELECTROSLAG WELDING OF CLAD BILLETS; DIMENSIONS OF CLAD BILLETS UNDER ROLLING; HEATING UNDER ROLLING AND ROLLING OF CLAD BILLETS; ADDITION MATERIALS FOR WELDING OF CLAD BILLETS AND CONDITIONS OF HEAT TREATMENT; PRODUCTION OF THICK-WALLED WELDED PRESSURE VESSELS FROM CLAD STEELS; TECHNOLOGY OF WELDING CLAD VESSELS; CONCERNING THE QUESTION ON REJECTION OF HIGH-TEMPERATURE TREATMENT OF WELDED VESSELS AND IMPROVEMENT OF QUALITY OF METAL OF DURABLE CASING. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-646 882 13/13 13/10.1
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

WINDOWS FOR EXTERNAL OF INTERNAL HYDROSTATIC PRESSURE VESSELS. PART I. CONICAL ACRYLIC WINDOWS UNDER SHORT-TERM PRESSURE APPLICATION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JAN 67 104P SYACHIW,J. D. ;GRAY,K. O. ;
REPT. NO. NCEL-TR-512
PROJ: Y-F015-01-07-001

UNCLASSIFIED REPORT

DESCRIPTORS: (*TRANSPARENT PANELS, ACRYLIC RESINS), (*PRESSURE VESSELS, TRANSPARENT PANELS), CONICAL BODIES, HYDROSTATIC PRESSURE, STRUCTURES, UNDERWATER, LOADING(MECHANICS), FAILURE(MECHANICS), STRUCTURAL PROPERTIES (U)

CONICAL ACRYLIC WINDOWS FOR FIXED OCEAN-FLOOR STRUCTURES WERE PLACED UNDER SHORT-TERM LOADING (PRESSURIZATION FROM ZERO TO FAILURE AT A FIXED RATE). THE WINDOWS, OF DIFFERENT THICKNESSES AND DIFFERENT INCLUDED CONICAL ANGLES, WERE SUBJECTED TO VARIOUS APPLIED PRESSURES, AND THEIR SUBSEQUENT BEHAVIOR WAS STUDIED. ACRYLIC WINDOWS, IN THE FORM OF TRUNCATED CONES WITH INCLUDED ANGLES OF 30?, 60?, 90?, 120?, AND 150?, WERE TESTED TO DESTRUCTION AT AMBIENT ROOM TEMPERATURE BY APPLYING HYDROSTATIC PRESSURE TO THE BASE OF THE TRUNCATED CONE AT A CONTINUOUS RATE OF 650 PSI/MIN. THE PRESSURE AT WHICH THE WINDOWS FAILED AND THE MAGNITUDE OF DISPLACEMENT THROUGH THE WINDOW MOUNTING AT DIFFERENT PRESSURE LEVELS WERE RECORDED. THE ULTIMATE STRENGTH OF THE CONICAL WINDOWS (DENOTED BY THE CRITICAL PRESSURE AT WHICH ACTUAL FAILURE OCCURRED) WAS FOUND TO BE RELATED BOTH TO THICKNESS AND INCLUDED CONICAL ANGLE. GRAPHS ARE PRESENTED DEFINING THE RELATIONSHIPS OF CRITICAL PRESSURE VERSUS THICKNESS-TO-DIAMETER RATIO, AND PRESSURE VERSUS MAGNITUDE OF DISPLACEMENT FOR THE WINDOWS. NONDIMENSIONAL SCALING FACTORS FOR CRITICAL PRESSURE AND DISPLACEMENT APPLICABLE TO LARGE-DIAMETER WINDOWS ARE DISCUSSED AND PRESENTED IN GRAPHIC FORM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-652 343 13/13 13/10.1
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

WINDOWS FOR EXTERNAL OR INTERNAL HYDROSTATIC PRESSURE VESSELS. PART II. FLAT ACRYLIC WINDOWS UNDER SHORT-TERM PRESSURE APPLICATION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 67 84P STACHIW,J. D. ;DUNN,G. M. ;GRAY,K. O. ;
REPT. NO. NCEL-TR-527
PROJ: Y-F015-01-07-001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-646 882, PART 1.

DESCRIPTORS: (*PRESSURE VESSELS, TRANSPARENT PANELS), (*TRANSPARENT PANELS, *ACRYLIC RESINS), UNDERWATER, STRUCTURES, HYDROSTATIC PRESSURE, LOADING(MECHANICS), DISKS, FAILURE(MECHANICS) (U)

FLAT, DISK-SHAPED ACRYLIC WINDOWS OF DIFFERENT THICKNESS-TO-DIAMETER RATIOS HAVE BEEN TESTED TO DESTRUCTION UNDER SHORT-TERM HYDROSTATIC LOADING AT ROOM TEMPERATURES, WHERE SHORT-TERM LOADING IS DEFINED AS PRESSURIZING THE WINDOW HYDROSTATICALLY ON ITS HIGH-PRESSURE FACE AT A 650-PSI/MINUTE RATE TILL FAILURE OF THE WINDOW TAKES PLACE. CRITICAL PRESSURES AND DISPLACEMENTS OF WINDOWS WITH THICKNESS TO EFFECTIVE DIAMETER RATIOS LESS THAN 1.0 HAVE BEEN RECORDED AND PLOTTED. THE CRITICAL PRESSURES DERIVED FROM TESTING FLAT WINDOWS IN FLANGES WITH 1.5-INCH, 3.3-INCH, AND 4.0-INCH OPENINGS HAVE BEEN FOUND APPLICABLE ALSO TO FLANGES WITH LARGER OPENINGS, SO LONG AS THE LARGER WINDOWS ARE OF THE SAME T/D SUB I AND D SUB O/D SUB I RATIOS, WHERE T IS THICKNESS OF THE WINDOW, D SUB I IS THE CLEAR OPENING IN THE FLANGE AND THEREFORE THE EFFECTIVE DIAMETER OF THE WINDOW EXPOSED TO AMBIENT ATMOSPHERIC PRESSURE AND D SUB O IS OVERALL DIAMETER OF THE WINDOW FACE EXPOSED TO HYDROSTATIC PRESSURE. THE PERFORMANCE OF FLAT WINDOWS UNDER SHORT-TERM HYDROSTATIC PRESSURE HAS BEEN FOUND TO BE COMPARABLE TO THAT OF CONICAL WINDOWS WITH INCLUDED ANGLE EQUAL TO, OR LARGER THAN 90 DEGREES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-652 411 13/4 20/11 13/13
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

PHOTOELASTIC ANALYSIS OF OPENINGS IN SPHERICAL AND CYLINDRICAL VESSELS SUBJECTED TO INTERNAL PRESSURE. (U)

DESCRIPTIVE NOTE: RESEARCH REPT.,
JAN 64 26P LEVEN,M. M. ;
REPT. NO. RR-64-917-514-R1
CONTRACT: NOBS-78182
PROJ: SF-013-06

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, PHOTOELASTICITY), SPHERES, CYLINDRICAL BODIES, STRESSES, PRESSURE, TESTS, EXPERIMENTAL DATA (U)

THE PRESENT REPORT DEALS WITH TESTS INVOLVING OPENINGS IN SPHERICAL VESSELS AND A TEST INVOLVING A DOUBLE TAPER EXTERNALLY REINFORCED OPENING IN A THIN-WALLED CYLINDRICAL VESSEL. THE DIMENSIONAL PARAMETERS AND MAXIMUM STRESSES FOR THE TESTS ARE LISTED. THE STRESS PATTERNS AND STRESS DISTRIBUTIONS FOR THE TESTS ARE PRESENTED. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-653 749 13/10.1
ALLIED RESEARCH ASSOCIATES INC CONCORD MASS

PHOTOELASTIC INVESTIGATION OF STRESSES AT WINDOWS AND HATCHES IN SPHERICAL PRESSURE VESSELS, (U)

DEC 63 25P HAMILTON,HAROLD ;BECKER, HERBERT ;
REPT. NO. ARA-F-9250-3
CONTRACT: NOBS-88648

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, STRESSES), (*UNDERWATER VEHICLES, STRESSES), SPHERES, PHOTOELASTICITY, HATCHES, LOADING(MECHANICS), MECHANICAL PROPERTIES (U)
IDENTIFIERS: WINDOWS (U)

THROUGH THREE-DIMENSIONAL PHOTOELASTICITY, STRESSES WERE DETERMINED IN EXTERNALLY PRESSURIZED SPHERES WITH SIMULATED HATCHES AND WINDOWS REPRESENTATIVE OF BATHYSCAPH PRESSURE VESSEL CONSTRUCTION. STRESSES WERE DETERMINED FOR VARIOUS SEAT CHAMFER ANGLES AND MATERIAL COMBINATIONS. IN ADDITION, AN EXPLORATORY STUDY WAS MADE OF THE EFFECT OF FRICTION UPON THE STRESSES IN WINDOWS. A MAJOR RESULT OF THE STUDY IS THE INDICATION THAT FOR HATCH CHAMFER ANGLES OF 15 DEGREES OR LESS NO LOCAL REINFORCEMENT IS REQUIRED EITHER IN THE SPHERE OR IN THE HATCH. NO CONCLUSIONS WERE REACHED CONCERNING SPHERE DESIGN NEAR A WINDOW SINCE ADDITIONAL DATA ON EFFECTS OF FRICTION ARE REQUIRED BEFORE THIS PROBLEM CAN BE RESOLVED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-657 080 13/4 20/11
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED PALO ALTO RESEARCH LAB

OPTIMUM THICKNESS TRANSITIONS FOR CYLINDRICAL PRESSURE VESSELS WITH HEMISPHERICAL HEADS. (U)

DESCRIPTIVE NOTE: REVISED ED.,
MAR 67 4P TSUI,E. Y. ;BURNS,A. BRUCE ;

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN JOURNAL OF SPACECRAFT AND ROCKETS V4 N6 P716-9 JUN 1967.
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT RECEIVED 11 OCT 66.

DESCRIPTORS: (*PRESSURE VESSELS, THICKNESS), CYLINDRICAL BODIES, CONFIGURATION, DIFFERENTIAL EQUATIONS, STRUCTURAL SHELLS, LOADING(MECHANICS) (U)

AN ANALYSIS IS PRESENTED FOR TWO NEW THICKNESS TRANSITION CONFIGURATIONS FOR CYLINDRICAL PRESSURE VESSELS WITH HEMISPHERICAL HEADS. THESE CONFIGURATIONS, WHICH EXTEND ON BOTH SIDES OF THE JUNCTURE BETWEEN THE SHELLS, ARE THE VERSINE VARIATION AND THE BILINEAR VARIATION. THE BILINEAR TRANSITION IS SHOWN TO RESULT IN LIGHTER DESIGNS WHILE HOLDING OVERSTRESS TO A NEGLIGIBLE AMOUNT. NONDIMENSIONAL CURVES ARE PRESENTED WHICH SHOW THE OVER-ALL VESSEL WEIGHT FOR BOTH TYPES OF TRANSITION. RESULTS ARE OBTAINED BY SOLVING NUMERICALLY A SYSTEM OF SECOND-ORDER DIFFERENTIAL EQUATIONS APPLICABLE TO THIN ELASTIC ISOTROPIC SHELLS OF VARIABLE THICKNESS, USING AN ESTABLISHED DECOUPLING CRITERION FOR SPHERICAL AND CYLINDRICAL SHELLS UNDER EDGE LOADS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-661 225 13/4 13/13
NAVAL ORDNANCE LAB WHITE OAK MD

HIGH PRESSURE CHAMBER DESIGN. (U)

AUG 67 25P DAWSON,VICTOR C. D. ;
SEIGEL,ARNOLD E. ;
REPT. NO. NOLTR-67-121

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, HIGH-PRESSURE RESEARCH), CYLINDRICAL BODIES, DESIGN, ELASTIC SHELLS (U)

THE PRESSURE CONTAINMENT CAPABILITY OF A MONOBLOC CYLINDRICAL CHAMBER THAT REMAINS ELASTIC IS LIMITED BY THE MECHANICAL STRENGTH OF THE CHAMBER MATERIAL TO VALUES OF ABOUT 100,000 POUNDS PER SQUARE INCH. HIGHER PRESSURES CAN BE CONTAINED BY USING A SHRINK-FIT CONSTRUCTION OR AUTOFRETTAGE AND THESE TECHNIQUES PROVIDE APPROXIMATELY TWICE THE PRESSURE CONTAINMENT CAPABILITY THAT CAN BE OBTAINED WITH THE MONOBLOC CONSTRUCTION. THIS REPORT DESCRIBES AND ANALYZES A SEGMENTED CHAMBER THAT GREATLY EXTENDS THE HIGH PRESSURE CAPABILITY OF A CYLINDRICAL CHAMBER IN THE ELASTIC RANGE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-663 203 11/6 13/4 20/11
NAVAL RESEARCH LAB WASHINGTON D C

FRACTURE DEVELOPMENT AND MATERIAL PROPERTIES IN PVRC-PENN STATE PRESSURE VESSEL. (U)

DESCRIPTIVE NOTE: MEMORANDUM REPT.,
OCT 67 26P COOLEY,L. A. ;LANGE,E. A. ;
REPT. NO. NRL-MR-1827
PROJ: RR-007-01-46-5420, ENG-NAV-67-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, MECHANICAL PROPERTIES), (*PRESSURE VESSELS, STEEL), FRACTURE(MECHANICS), TENSILE PROPERTIES, FAILURE(MECHANICS), CRACKS, TOUGHNESS, FATIGUE(MECHANICS), TEMPERATURE (U)
IDENTIFIERS: STEEL A 212 A (U)

A CHARACTERIZATION OF MATERIALS WAS CONDUCTED IN RELATION TO THE TERMINAL, BURST-TYPE, FAILURE OF A PVRC PRESSURE VESSEL IN A212A STEEL AT 110F. MATERIALS WERE CHARACTERIZED WITH RESPECT TO CHEMICAL COMPOSITION, TENSILE PROPERTIES, FRACTURE TOUGHNESS INCLUDING CHARPY-V AND TEAR ENERGIES, DROP-WEIGHT NDT, MICROGRAPHY AND ELECTRON FRACTOGRAPHY. THE INITIATION AND GROWTH OF A 34-IN. LONG FATIGUE CRACK WAS SHOWN TO BE CAUSED BY MECHANICAL ASPECTS RATHER THAN MATERIAL DEFICIENCIES AND THE PLASTIC INSTABILITY BURST, BRITTLE RUN, AND CRACK ARREST WERE IN COMPLETE ACCORD WITH THE FRACTURE ANALYSIS DIAGRAM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-663 879 18/10
NAVAL RESEARCH LAB WASHINGTON D C

AVAILABILITY OF DATA ON IRRADIATED MATERIALS AS RELATED TO DESIGN REQUIREMENTS FOR WATER COOLED REACTOR PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
AUG 67 31P HAWTHORNE,J. R. ;LOSS,F. J. ;
REPT. NO. NRL-6625
PROJ: RR-007-01-46-5409, SF-020-01-05-0858

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, REACTOR SYSTEM COMPONENTS), (*REACTOR MATERIALS, *STEEL), RADIATION DAMAGE, FATIGUE(MECHANICS), ANNEALING, TRANSITION TEMPERATURE, FRACTURE(MECHANICS), BRITTLENESS, TEST METHODS (U)

NRL HAS COMPLETED A SURVEY OF KNOWN EXPERIMENTAL PROGRAMS WHICH HAVE CONTRIBUTED TO AND ARE ATTEMPTING TO SATISFY THE DATA REQUIREMENTS NECESSARY FOR THE DEVELOPMENT OF NUCLEAR REACTOR PRESSURE VESSEL SPECIFICATIONS AND OPERATIONS. DESIGNER REQUIREMENTS HAVE BEEN SET FORTH IN THE REPORT 'PROPERTIES OF IRRADIATED MATERIALS NEEDED FOR THE DESIGN OF REACTOR VESSELS,' BY D. W. MCLAUGHLIN WHICH WAS PRESENTED AS AN ASME RESEARCH COMMITTEE REPORT TO THE 1966 ASTM SYMPOSIUM ON EFFECTS OF RADIATION ON STRUCTURAL METALS. THIS REPORT WAS THE PRIMARY REFERENCE USED IN WEIGHING THE PRESENTATION OF DATA AVAILABILITY AGAINST DESIGNER REQUIREMENTS. AN ANALYSIS OF INDIVIDUAL MATERIAL PROPERTIES AND PROBLEM AREAS IS PRESENTED RATHER THAN AN EXTENSIVE DATA COMPILATION. THE AREAS CONSIDERED ARE LOW-CYCLE AND HIGH-CYCLE FATIGUE, BRITTLE FRACTURE RESISTANCE (TRANSITION TEMPERATURE CHARACTERISTICS AND FRACTURE MECHANICS), STATIC LOAD STRENGTH, AND RECOVERY OF ORIGINAL PROPERTIES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-663 882 18/13 20/11
NAVAL RESEARCH LAB WASHINGTON D C

BASIC ASPECTS OF CRACK GROWTH AND FRACTURE, (U)

NOV 67 82P IRWIN,G. R. ;KRAFFT,J. M. ;PARIS,P. C. ;WELLS,A. A. ;
REPT. NO. NRL-6598

UNCLASSIFIED REPORT

DESCRIPTORS: (*NUCLEAR REACTORS, PRESSURE VESSELS), (*PRESSURE VESSELS, FRACTURE(MECHANICS)), CRACK PROPAGATION, DESIGN, CONTROL, SAFETY, TOUGHNESS, PLASTICITY, STRESS CORROSION, TEMPERATURE, STRESSES, MATHEMATICAL ANALYSIS, BRITTLENESS, FATIGUE(MECHANICS), METALS, DUCTILITY, MEASUREMENT, CRACKS (U)
IDENTIFIERS: CRACK GROWTH (U)

A NEAR APPROACH TO ABSOLUTE FRACTURE SAFETY IN BOILING WATER (BW) AND PRESSURIZED WATER (PW) NUCLEAR REACTOR PRESSURE VESSELS REQUIRES A VERY CONSERVATIVE FRACTURE CONTROL PLAN. SUCH A PLAN MUST ASSUME THAT ANY PLAUSIBLE CRACKLIKE DEFECT, WHICH HAS NOT BEEN PROVED ABSENT BY INSPECTION, MAY EXIST IN THE VESSEL. REQUIREMENTS FOR DESIGN, MATERIALS, AND INSPECTION MAY THEN BE ESTABLISHED IN A CONSERVATIVE WAY RELATIVE TO ESTIMATES OF PROGRESSIVE CRACK EXTENSION BEHAVIOR. THESE ESTIMATES ARE ASSISTED BY ELASTIC AND PLASTIC METHODS OF ANALYSIS OF CRACKS IN TENSION. APPROXIMATE METHODS OF ASSIGNING K SUB LC VALUES TO MEASUREMENTS OF CRACK TOUGHNESS IN TERMS OF A BRITTLE-DUCTILE TRANSITION TEMPERATURE ARE VALUABLE IN REVIEWING METHODS OF FRACTURE CONTROL WHICH HAVE RECEIVED TRIAL IN THE PAST, SUCH AS THE NRL FRACTURE ANALYSIS DIAGRAM AND THE LEAK-BEFORE-BREAK TOUGHNESS CRITERION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-664 460 11/6 18/13
NAVAL RESEARCH LAB WASHINGTON D C

THE TENSILE PROPERTIES OF SELECTED STEELS FOR USE IN NUCLEAR REACTOR PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: PHASE I OF FINAL REPT.,
DEC 67 59P KLIER,EUGENE P. ;HAWTHORNE,
J. R. ;STEELE,LENDELL E. ;
REPT. NO. NRL-6649
PROJ: RR-007-01-46-5409, SF-020-01-05-0858

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, TENSILE PROPERTIES), (*NUCLEAR REACTORS, STEEL), (*PRESSURE VESSELS, NUCLEAR REACTORS), SHEAR STRESSES, FRACTURE(MECHANICS), STRAIN(MECHANICS), NEUTRONS, METALLOGRAPHY, BRITTLENESS, MICROSTRUCTURE, RADIATION DAMAGE, TRANSITION TEMPERATURE, FRACTOGRAPHY, DUCTILITY (U)
IDENTIFIERS: STEEL A-212B, STEEL A-302B, STEEL A-350-LF1, STEEL A350-LF3, STEEL A353, STEEL T-1, STEEL HY-80 (U)

SEVEN STEELS NOW USED OR HAVING POTENTIAL FOR USE IN THE CONSTRUCTION OF NUCLEAR REACTOR CONTAINMENT VESSELS WERE EVALUATED IN UNIAXIAL TENSION AT 75F FOLLOWING IRRADIATION AT <250F. EXPERIMENT IRRADIATIONS INVOLVED NEUTRON FLUENCES UP TO 9.5 X 10 TO THE 19TH POWER N/CM SQ. (> 1MEV). TENSILE PROPERTIES OF THE A212-B, A302-B, A350-LF1 (MODIFIED), A350-LF3, A353, T-1, AND HY-80 (NI-CR-MO) STEELS WERE DETERMINED AS CONVENTIONAL TENSILE AND YIELD STRENGTH AND PERCENT REDUCTION OF AREA. IN ADDITION, OBSERVED STRESS-STRAIN RELATIONSHIPS WERE PLOTTED USING BOTH NOMINAL STRESS-PERCENT REDUCTION OF AREA COORDINATES AND TRUE STRESS-NATURAL STRAIN COORDINATES. CURVES GIVEN IN THE LATTER COORDINATE SYSTEM WERE ALSO EXPRESSED IN SUITABLE ANALYTIC FORM. ALL INDIVIDUAL TENSILE DATA WERE COMPILED IN TABULAR FORM, AND STRESS-STRAIN CURVES WERE SUMMARIZED AS BANDS GIVING MAXIMUM AND MINIMUM PROPERTIES BEHAVIOR. LIMITED METALLOGRAPHIC AND FRACTOGRAPHIC DATA WERE OBTAINED TO ESTABLISH THE METALLURGICAL STRUCTURES OF THE STEELS AND TO DEPICT THE TRANSITION FROM A DUCTILE SHEAR FRACTURE TO A BRITTLE FLAT FRACTURE AT HIGH NEUTRON FLUENCES FOR THE MORE BRITTLE STEELS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-664 646 18/10
NAVAL RESEARCH LAB WASHINGTON D C

THE EFFECTS OF COUPLING NUCLEAR RADIATION WITH STATIC AND CYCLIC SERVICE STRESSES AND OF PERIODIC PROOF TESTING ON PRESSURE VESSEL MATERIAL BEHAVIOR. (U)

DESCRIPTIVE NOTE: PHASE I OF FINAL REPT.,
AUG 67 45P HAWTHORNE,J. R. ;LOSS,F. J. ;
REPT. NO. NRL-6620
PROJ: RR-007-01-46-5409, SF-020-01-05-0858

UNCLASSIFIED REPORT

DESCRIPTORS: (*REACTOR MATERIALS, *STEEL), (*PRESSURE VESSELS, *RADIATION DAMAGE), STRUCTURAL PARTS, NUCLEAR RADIATION, STRESSES, TEST METHODS, AGING(MATERIALS), FATIGUE(MECHANICS), TRANSITION TEMPERATURE, EMBRITTLEMENT, DUCTILITY, NEUTRON REACTIONS (U)
IDENTIFIERS: HYDRO-TESTING, STEEL A-302, STEEL A-350 (U)

THE NUCLEAR SERVICE PERFORMANCE OF STRUCTURAL STEELS AS INFLUENCED BY STATIC AND CYCLIC STRESS APPLICATIONS DURING RADIATION EXPOSURE WAS EXAMINED AND DOCUMENTED WITH EXPERIMENTAL RESULTS. THE SIGNIFICANCE AND MERITS OF INITIAL AND SUBSEQUENT PROOF TESTS OF LARGE STRUCTURAL COMPONENTS SUCH AS THE HYDRO-TESTING OF NUCLEAR REACTOR PRESSURE VESSELS WERE ALSO REVIEWED AND EVALUATED. PERFORMANCE FOLLOWING PRELOAD IN THE FORM OF WARM PRESTRESSING AS WELL AS AGING EMBRITTLEMENT WERE AMONG THOSE FACTORS CONSIDERED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-667 834 13/4 20/11
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

PHOTOELASTIC INVESTIGATION OF STRESS CONCENTRATIONS IN SPHERE-CYLINDER TRANSITION REGIONS: INCLUDING A COMPARISON OF RESULTS FROM PHOTOELASTIC AND FINITE ELEMENT ANALYSES. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUL 66-30 JUN 67,
APR 68 108P TAKAHASHI,S. K. ;MARK,R. ;
REPT. NO. NCEL-TR-572
PROJ: Y-R009-03-01-005

UNCLASSIFIED REPORT

DESCRIPTORS: (*PHOTOELASTICITY, CYLINDRICAL BODIES), (*PRESSURE VESSELS, STRESSES), SPHERES, DIFFUSION, MATERIALS, LIGHT, POLARISCOPES, MACHINING, BONDING, DESIGN, MODELS(SIMULATIONS), EPOXY PLASTICS, THICKNESS (U)

THE STUDY INVESTIGATES STRESS DISTRIBUTIONS IN SPHERE-CYLINDER TRANSITION REGIONS OF EXTERNALLY PRESSURIZED THICK-WALLED VESSELS; IT COMPARES DATA DETERMINED BY TWO DIFFERENT APPROACHES: PHOTOELASTIC ANALYSIS AND FINITE ELEMENT COMPUTER PROGRAMS. THESE APPROACHES AFFORD A CAPABILITY FOR ANALYZING COMPLICATED DEEP OCEAN STRUCTURES THAT ARE OF CONSIDERABLE INTEREST TO THE U. S. NAVY. TWO SMALL-SCALE EPOXY MODELS OF THE PROTOTYPE STRUCTURES WERE LOADED BY 4- AND 10-PSI EXTERNAL PRESSURE AT A CRITICAL TEMPERATURE (290F) AND THEN THE STRESSES WERE FROZEN BY COOLING THE MATERIAL. THE FIRST MODEL HAD RELATIVELY THIN WALLS (CYLINDER DIAMETER-TO-WALL THICKNESS RATIO = 15), AND INCORPORATED 60% BALANCED OPENING REINFORCEMENT AT THE TRANSITION. THE AMOUNT OF REINFORCEMENT IS EXPRESSED AS A PERCENTAGE OF THE MATERIAL REMOVED FROM THE VESSEL SHELL TO FORM THE OPENING. THE REINFORCEMENT IS BALANCED WHEN EQUAL AMOUNTS ARE PLACED ON THE INSIDE AND OUTSIDE OF THE VESSEL. THE SECOND HAD A CYLINDER DIAMETER-TO-WALL THICKNESS RATIO OF 4, AND 65% BALANCED OPENING REINFORCEMENT. AFTER STRESS FREEZING, THE MODELS WERE SLICED LONGITUDINALLY AND TRANSVERSELY AND THE MERIDIONAL AND CIRCUMFERENTIAL STRESSES WERE DETERMINED PHOTOELASTICALLY WITH A DIFFUSED-LIGHT POLARISCOPE. THE PHOTOELASTIC SOLUTIONS WERE USED TO VERIFY THE STRESSES CALCULATED BY FINITE ELEMENT COMPUTER PROGRAMS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-671 094 18/8 11/6
NAVAL RESEARCH LAB WASHINGTON D C

IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. 1 FEB-30 APR 68.
MAY 68 41P STEELE ,L. E. ;HAWTHORNE , J. R. ;SERPAN,C. Z. , JR. ;POTAPOVS,ULDIS ;

REPT. NO. NRL-MR-1872
PROJ: RR007-01-46-5409

UNCLASSIFIED REPORT

DESCRIPTORS: (*NUCLEAR REACTORS, *STRUCTURAL PARTS), (*RADIATION DAMAGE, *PRESSURE VESSELS), STEEL, CHEMICAL PROPERTIES, NEUTRONS, EMBRITTLEMENT, ABSORPTION, DEPOSITS, MECHANICAL PROPERTIES, NICKEL ALLOYS, CHROMIUM ALLOYS, WELDS, MOLYBDENUM ALLOYS, NOTCH SENSITIVITY, DUCTILITY, IRON ALLOYS (U)
IDENTIFIERS: STEEL A302B, STEEL A533B, STEEL A350 (U)

THE RESEARCH PROGRAM OF THE NRL METALLURGY DIVISION, REACTOR MATERIALS BRANCH, IS DEVOTED TO THE DETERMINATION OF THE EFFECTS OF NUCLEAR RADIATION UPON THE PROPERTIES OF STRUCTURAL MATERIALS. THE OVERALL PROGRAM IS SPONSORED BY THE OFFICE OF NAVAL RESEARCH, THE U.S. ATOMIC ENERGY COMMISSION, AND THE ARMY NUCLEAR POWER PROGRAM. SINCE RESEARCH FINDINGS WHICH APPLY TO THE OBJECTIVES OF ONE SPONSORING AGENCY ARE ALSO OF INTEREST TO THE OTHERS, THE OVERALL PROGRAM PROGRESS IS REPORTED HEREIN. THIS REPORT, COVERING RESEARCH FOR THE PERIOD 1 FEBRUARY-30 APRIL 1968, INCLUDES THE FOLLOWING: (1) CONTROLLING THE RADIATION EMBRITTLEMENT SENSITIVITY OF NI-CR-MO WELD DEPOSITS BY VARYING THEIR CHEMICAL COMPOSITION, (2) INFLUENCE OF PRIOR TEMPER EMBRITTLEMENT ON THE IRRADIATION RESPONSE OF NI-CR-MO STEEL, (3) RELATIVE SSOF IRRADIATION RESPONSE OF BASE PLATE, WELD METAL, AND WELD HEAT AFFECTED ZONE OF A 7-1/2-IN.-THICK A533-B CLASS I PRODUCTION WELDMENT, (4) DROP WEIGHT NDT VERSUS CHARPY-V ENERGY ABSORPTION LEVEL IN 6-3/8-IN. TYPE A533-B CLASS I AND II STEEL PLATE, AND (5) MECHANICAL PROPERTIES EVALUATION OF PM-2A REACTOR PRESSURE VESSEL STEEL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-671 807 18/8 18/9 13/4
NAVAL RESEARCH LAB WASHINGTON D C

NOTCH DUCTILITY PROPERTIES OF SM-1A REACTOR PRESSURE VESSEL FOLLOWING THE IN-PLACE ANNEALING OPERATION. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
MAY 68 31P POTAPOVS,ULDIS (HAWTHORNE,J.
RUSSELL (SERPAN,CHARLES Z. , JR;
REPT. NO. NRL-6721
PROJ: USA-ERG-3-67, USA-ERG-19-66
TASK: M01-14

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, *RADIATION DAMAGE), IMPACT TESTS, DUCTILE BRITTLE TRANSITION, NUCLEAR INDUSTRIAL APPLICATIONS, NON-DESTRUCTIVE TESTING, ANNEALING, MAPS, EMBRITTLEMENT, STEEL, NOTCH TOUGHNESS (U)
IDENTIFIERS: GRAPHS(CHARTS), SM-1A REACTOR VESSEL (U)

THE EMBRITTLEMENT CONDITION OF THE ARMY SM-1A REACTOR PRESSURE VESSEL, AS MODIFIED BY THE RECENTLY COMPLETED IN-PLACE ANNEAL, WAS ASSESSED AND AN ANALYSIS WAS MADE OF THE REEMBRITTLEMENT BEHAVIOR OF THE VESSEL STEEL WITH SUBSEQUENT RADIATION SERVICE. EXPERIMENTAL RESULTS FROM THE REACTOR SURVEILLANCE PROGRAM DEVELOPED THROUGH ONE COMPLETE IRRADIATION AND ANNEALING CYCLE ARE PRESENTED, TOGETHER WITH A SUMMARY OF EXPERIMENTAL INFORMATION ON THE ANNEALING RESPONSE OF THE VESSEL STEEL (A350-LF1, MOD.) FROM ACCELERATED IRRADIATION PROGRAMS. THESE DATA INDICATE A 0 DEG F MAXIMUM PRESSURE VESSEL WALL CHARPY-V 30 FT-LB TRANSITION TEMPERATURE AFTER THE IN-PLACE ANNEAL VERSUS A -80 DEG F PRESERVICE TRANSITION TEMPERATURE (BASED ON THE NOTCH-DUCTILITY PROPERTIES OF A DUPLICATE RING FORGING). THE MAXIMUM CHARPY-V 30 FT-LB TRANSITION TEMPERATURE OF THE PRESSURE VESSEL BEFORE THE ANNEALING OPERATION WAS ESTIMATED AT 190 DEG F. A PROJECTION OF POSTANNEAL PRESSURE VESSEL LIFETIME IN TERMS OF NEUTRON FLUENCE >0.5 MEV WAS DERIVED FROM SPECTRA CALCULATIONS AND THE EXPERIMENTALLY PREDICTED REIRRADIATION RESPONSE OF THE PRESSURE VESSEL STEEL. THE MAXIMUM PERMISSIBLE VESSEL WALL FLUENCE IS ESTIMATED AT 5.5X10 TO THE 19TH POWER N/SQ CM > 0.5 MEV. THIS IS COMPARABLE TO 124.7 MEGAWATT YEARS OF REACTOR OPERATION. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-672 890 18/13 13/4 20/11
NAVAL RESEARCH LAB WASHINGTON D C

NOTCH DUCTILITY AND TENSILE PROPERTY EVALUATION OF THE PM-2A REACTOR PRESSURE VESSEL. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
JUN 68 23P SERPAN,CHARLES Z. , JR;
REPT. NO. NRL-6739
PROJ: RR-007-01-46-5409

UNCLASSIFIED REPORT

DESCRIPTORS: (*NUCLEAR REACTORS, PRESSURE VESSELS), (*PRESSURE VESSELS, MECHANICAL PROPERTIES), NOTCH SENSITIVITY, REACTOR OPERATION, TENSILE PROPERTIES, NEUTRONS, DOSIMETERS, LIGHT WATER REACTORS, RADIATION DAMAGE, EMBRITTLEMENT, THICKNESS, BRITTLENESS, NON-DESTRUCTIVE TESTING, TRANSITION TEMPERATURE, STEEL, DEFECTS(MATERIALS), FRACTURE(MECHANICS), PRESSURIZATION (U)
IDENTIFIERS: *FRACTURE TOUGHNESS (U)

FOLLOWING THE PRESSURIZATION-TO-FAILURE TESTING OF THE PM-2A REACTOR PRESSURE VESSEL, SEVERAL SECTIONS OF STEEL WERE REMOVED FROM THE VESSEL WALL IN A REGION ADJACENT TO THE ARTIFICIAL DEFECT. CHARPY V-NOTCH AND TENSION TEST SPECIMENS MACHINED FROM ONE OF THESE SECTIONS HAVE BEEN EVALUATED. THE IRRADIATED-CONDITION 30 FT-LB TRANSITION TEMPERATURES FOR THE 1/4-THICKNESS (NEAREST TO THE CORE) AND 3/4-THICKNESS LOCATIONS IN THE VESSEL WALL WERE +115F AND +55F, RESPECTIVELY, FOR MEASURED FISSION-SPECTRUM FLUENCES OF 7.3 AND 4.0 X 10 TO THE 18TH POWER N/SQ CM (GREATER THAN 1 MEV). THE 1/4-THICKNESS PROPERTIES AND FLUENCE MOST NEARLY REPRESENTED THOSE AT THE TIP OF THE ARTIFICIAL DEFECT. THE 0.2% YIELD STRENGTH FOR THE 1/4-THICKNESS LOCATION WAS 97,620 PSI AT -20F (FAILURE TEMPERATURE) AND 92,200 PSI AT +72F (TEMPERATURE AT TIME OF ACID-SHARPENING TREATMENT OF ARTIFICIAL DEFECT). SIGNIFICANT UNIFORM ELONGATION, REDUCTION OF AREA, AND ELONGATION PER 1 IN. WERE RETAINED BY THE STEEL. AN ASSESSMENT OF THE STRESS, TEMPERATURE, AND FLAW-SIZE CONDITIONS FOR THE PM-2A FAILURE, AS INDEXED BY THE IRRADIATED-CONDITION MECHANICAL PROPERTIES, INDICATES THAT THE FAILURE IS IN AGREEMENT WITH THE GENERALIZED FRACTURE ANALYSIS DIAGRAM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-680 602 18/10 11/6 13/5
NAVAL RESEARCH LAB WASHINGTON D C

THE EFFECT OF RESIDUAL ELEMENTS ON 550F IRRADIATION RESPONSE OF SELECTED PRESSURE VESSEL STEELS AND WELDMENTS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
NOV 68 33P POTAPOVS,ULDIS ;HAWTHORNE,J. RUSSELL ;
REPT. NO. NRL-6803
PROJ: RR-007-01-46-5409

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, RADIATION DAMAGE), (*WELDS, RADIATION DAMAGE), (*RADIATION DAMAGE, *PRESSURE VESSELS), NUCLEAR REACTORS, EMBRITTLEMENT, NUCLEAR RADIATION, IMPURITIES, SENSITIVITY (U)
IDENTIFIERS: STEEL A-302-B, STEEL A-543 (U)

THE EFFECT OF VARIABLE RESIDUAL ELEMENT CONTENTS ON 550F RADIATION EMBRITTLEMENT SENSITIVITY OF PRESSURE VESSEL STEELS WAS EXAMINED. RESULTS INDICATE THAT PHOSPHORUS AND COPPER CAN CONTRIBUTE SIGNIFICANTLY TO THE 550F RADIATION EMBRITTLEMENT SENSITIVITY OF TYPE A302-B STEEL. THE RESULTS ALSO SHOW THAT VANADIUM MAY HAVE A SLIGHT ADVERSE EFFECT AND THAT SULFUR IS NEUTRAL, ALTHOUGH IT SERVES TO DECREASE THE FULL SHEAR ENERGY ABSORPTION LEVEL OF THE STEEL. NITROGEN VARIATIONS FROM APPROXIMATELY EQUAL TO 0.008% TO 0.015% IN ALUMINUM DEOXIDIZED STEEL HAVE NO SIGNIFICANT EFFECT, WHILE THE ADDITION OF ALUMINUM TO NI-CR-MO STEEL WITH A GIVEN NITROGEN CONTENT MAY SLIGHTLY PROMOTE IRRADIATION EMBRITTLEMENT. THE PROGRAM RESULTS DEMONSTRATE THAT APPARENT INSENSITIVITY TO 550F IRRADIATION EMBRITTLEMENT CAN BE CONSISTENTLY ACHIEVED WITH LABORATORY HEATS OF A NOMINAL A302-B STEEL COMPOSITION BY MAINTAINING THE TOTAL RESIDUAL ELEMENT CONTENTS AT A LOW LEVEL. RADIATION EMBRITTLEMENT SENSITIVITY OF WELDMENTS WA' INVESTIGATED IN A PROGRAM AIMED AT THE DEVELOPMENT OF LOW SENSITIVITY WELD FILLERS FOR JOINING NI-CR-MO STEEL. DATA FROM THIS NEW PROGRAM AGAIN POINT TO COPPER AS A DOMINATING FACTOR IN DETERMINING RADIATION EMBRITTLEMENT SENSITIVITY, FURTHER VERIFYING THE RESULTS OBTAINED IN THE NRL-USS A302-B STEEL INVESTIGATION. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-682 482 20/11
BROWN UNIV PROVIDENCE R I DIV OF ENGINEERING

ELASTIC-PLASTIC ANALYSIS OF PRESSURE VESSEL COMPONENTS. (U)

JAN 69 25P MARCAL,PEDRO V. ;
MONITOR: ARPA E62

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT PRESSURE VESSEL AND PIPING CONFERENCE (1ST), USE OF THE COMPUTER IN PRESSURE VESSEL ANALYSIS, ASME COMPUTER SEMINAR, DALLAS, TEXAS, 20 SEP 68.

DESCRIPTORS: (*PRESSURE VESSELS, MECHANICAL PROPERTIES), PROGRAMMING(COMPUTERS), ELASTICITY, PLASTICITY, STRESSES, STRAIN(MECHANICS), PRESSURIZATION, YIELD POINT, STRAIN HARDENING, SPHERES, NOZZLES (U)
IDENTIFIERS: VON MISES RELATION (U)

THE REPORT PRESENTS A SURVEY ON THE USE OF DIGITAL COMPUTERS FOR ELASTIC-PLASTIC ANALYSIS OF PRESSURE VESSEL COMPONENTS. INCLUDED IS A REVIEW OF LINEAR INCREMENTAL STRESS STRAIN RELATIONS FOR A STRAIN HARDENING PRANDTL-REUSS MATERIAL WITH A VON MISES YIELD CRITERION AND THE FORMATION OF GENERALIZED STRESS STRAIN RELATIONS. CASE STUDIES ARE GIVEN OF AXISYMMMETRIC ELASTIC-PLASTIC ANALYSIS OF A TORISPHERICAL PRESSURE VESSEL, A FLUSH CYLINDRICAL NOZZLE IN A SPHERE AND A THICK-WALLED CYLINDER UNDER INTERNAL PRESSURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-684 067 18/8 11/6 20/11
NAVAL RESEARCH LAB WASHINGTON D C

USA STUDIES ON IRRADIATION EFFECTS TO ADVANCED PRESSURE VESSEL MATERIALS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. 1967-1968,
DEC 68 51P STEELE,LENDELL E. ;
REPT. NO. NRL-MR-1947
PROJ: RR-007-1-46-5409, SF-020-01-05-0858

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, REACTOR MATERIALS), (*ALLOYS, *RADIATION DAMAGE), STEEL, HYDROGEN EMBRITTLEMENT, FATIGUE(MECHANICS), HEAT TREATMENT, QUENCHING(COOLING), TENSILE PROPERTIES, THERMAL STABILITY, PHASE STUDIES, NICKEL ALLOYS, STAINLESS STEEL (U)
IDENTIFIERS: NICKEL ALLOY INCONEL 718, STEEL PH 13CR 8MO, STEEL 12N 5CR 3MO, STEEL 7.5N CR MO, NEUTRON EMBRITTLEMENT (U)

RESEARCH PROGRAMS DISCUSSED INCLUDE THE PREIRRADIATION EXAMINATION OF HIGH STRENGTH CANDIDATE PRESSURE VESSEL MATERIALS, STUDIES OF IRRADIATION EFFECTS ON THE PROPERTIES OF ADVANCED PRESSURE VESSEL MATERIALS, AND FATIGUE AND HYDROGEN EMBRITTLEMENT EFFECTS IN IRRADIATED HIGHER STRENGTH STEELS. HIGH POINTS OF EXPERIMENTAL ACCOMPLISHMENT ARE OUTLINED IN BRIEF. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-686 660 14/2 20/4
NAVAL RESEARCH LAB WASHINGTON D C

CONTROLLED DESTRUCTIVE TESTING OF PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
APR 69 14P GENNARI, JERVIS J. ICZUL, ERNEST C. I
REPT. NO. NRL-6855
PROJ: RF-101-03-46-5254, SF-199-03-01-1463

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, STRUCTURAL SHELLS), (*STRUCTURAL SHELLS, HYDROSTATIC TESTING), DEFORMATION, RUPTURE, FLUID FLOW, BRITTLENESS, METALS, GLASS TEXTILES, COMPOSITE MATERIALS, PHOTOMICROGRAPHY, TEST METHODS, TEST FACILITIES (U)

CONTROLLED DESTRUCTIVE TESTING OF SHELLS OR PRESSURE VESSELS BY THE HYDROSTATIC METHOD DISCUSSED IN THIS REPORT PROVIDES A GOOD MEANS OF ANALYZING THE FAILURE MODES OF THESE STRUCTURES. THE TECHNIQUE DESCRIBED ALLOWS A TEST TO BE HALTED AT ANY POINT - EVEN BEFORE PERMANENT DEFORMATION HAS OCCURRED. THIS TECHNIQUE ALSO HAS MERIT FOR TESTING PRESSURE VESSELS MADE OF CERAMIC OR OTHER BRITTLE MATERIAL, WHERE RUPTURE NORMALLY REDUCES THE VESSEL TO A POWDER OR TO NUMEROUS SMALL FRAGMENTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-689 789 13/13 13/10
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

WINDOWS FOR EXTERNAL OR INTERNAL HYDROSTATIC PRESSURE VESSELS. PART III. CRITICAL PRESSURE OF ACRYLIC SPHERICAL SHELL WINDOWS UNDER SHORT-TERM PRESSURE APPLICATIONS. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUL 66-AUG 68, JUN 69 166P STACHIW,J. D. ;BRIER,F. W. ;
REPT. NO. NCEL-TR-631
PROJ: Y-F38-535-005-01-001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO PART 1, AD-646 882, AND PART 2, AD-652 343.

DESCRIPTORS: (*PRESSURE VESSELS, TRANSPARENT PANELS), (*TRANSPARENT PANELS, *ACRYLIC RESINS), UNDERWATER, STRUCTURAL PARTS, FAILURE(MECHANICS), LOADING(MECHANICS), HYDROSTATIC PRESSURE, MODELS(SIMULATIONS), DESIGN, STRESSES, UNDERWATER VEHICLES (U)
IDENTIFIERS: *WINDOWS, UNDERWATER HABITATS (U)

MODEL AND FULL-SCALE ACRYLIC WINDOWS IN THE FORM OF SPHERICAL SHELL LENSES WITH PARALLEL CONVEX AND CONCAVE SURFACES HAVE BEEN IMPLODED BY LOADING THEIR CONVEX SURFACE HYDROSTATICALLY AT A 650-PSI/MIN RATE WHILE THEIR CONCAVE SURFACE WAS EXPOSED TO ATMOSPHERIC PRESSURE. THE THICKNESS OF THE MODEL WINDOWS VARIED FROM 0.250 TO 1.200 INCHES AND OF THE FULL-SCALE WINDOWS FROM 0.564 TO 4.000 INCHES, WHILE THE INCLUDED SPHERICAL SECTOR ANGLE OF THE LENS AND THE BEVEL ANGLE OF ITS EDGE VARIED FROM 30 TO 180 DEGREES IN 30-DEGREE INCREMENTS. THE LOW-PRESSURE FACE DIAMETERS OF THE MODEL WINDOWS VARIED FROM 1.423 TO 5.500 INCHES, WHILE THOSE OF THE FULL-SCALE WINDOWS VARIED FROM 6.200 TO 35.868 INCHES. IN ADDITION TO CRITICAL PRESSURES, DISPLACEMENTS OF THE LENS UNDER HYDROSTATIC PRESSURE WERE RECORDED AND PLOTTED AS FUNCTIONS OF PRESSURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-690 183 13/4
WATERVLIET ARSENAL N Y BENET R AND E LABS

THE DESIGN OF PRESSURE VESSELS FOR VERY HIGH PRESSURE OPERATION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 69 137P DAVIDSON,THOMAS E. ;KENDALL,
DAVID P. ;
PROJ: DA-1-T-061102-B-32-A
MONITOR: WVT 6917

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, STIFFENED CYLINDERS), (*ELASTIC SHELLS, HYDROSTATIC PRESSURE), STRUCTURAL PARTS, ELASTICITY, STRUCTURAL PROPERTIES, DESIGN, SEALS, MATHEMATICAL ANALYSIS, STRESSES, STRAIN(MECHANICS), HARDENING, YIELD POINT, FAILURE(MECHANICS) (U)
IDENTIFIERS: AUTOFRETTAGE (U)

THE REPORT IS A REVIEW OF THE THEORY AND PRACTICE OF PRESSURE VESSEL DESIGN FOR VESSELS OPERATING IN THE RANGE OF INTERNAL PRESSURES FROM 1 TO 55 KILOBARS (APPROXIMATELY 15,000 TO 800,000 PSI) AND UTILIZING FLUID PRESSURE MEDIA. THE FUNDAMENTALS OF THICK WALLED CYLINDER THEORY ARE REVIEWED, INCLUDING ELASTIC AND ELASTIC-PLASTIC THEORY, MULTI-LAYER CYLINDERS AND AUTOFRETTAGE. THE VARIOUS METHODS OF USING SEGMENTED CYLINDERS IN PRESSURE VESSEL DESIGN ARE REVIEWED IN DETAIL. THE FACTORS TO BE CONSIDERED IN THE SELECTION OF SUITABLE MATERIALS FOR PRESSURE VESSEL FABRICATION ARE DISCUSSED. THESE FACTORS INCLUDE STRENGTH, TOUGHNESS AND ENVIRONMENTAL FACTORS. A BRIEF REVIEW OF THE MATERIALS CURRENTLY AVAILABLE IS ALSO INCLUDED. THE REPORT ALSO INCLUDES A DISCUSSION OF PRESSURE SEALS AND CLOSURES SUITABLE FOR USE IN THIS PRESSURE RANGE AND OF METHODS OF SUPPORTING THE END CLOSURES OF THE VESSEL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-697 272 13/13 13/10
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

WINDOWS FOR EXTERNAL OR INTERNAL HYDROSTATIC PRESSURE VESSELS. PART IV. CONICAL ACRYLIC WINDOWS UNDER LONG-TERM PRESSURE APPLICATION AT 20,000 PSI. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. 1 JUL 67-30 JUN 68, OCT 69 133P STACHIW,J. D. ;
REPT. NO. NCEL-TR-645
PROJ: Y-F38-535-005-01-005

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO PART 3, AD-689 789.

DESCRIPTORS: (*PRESSURE VESSELS, TRANSPARENT PANELS), (*TRANSPARENT PANELS, *ACRYLIC RESINS), UNDERWATER VEHICLES, HYDROSTATIC PRESSURE, TEMPERATURE, CONICAL BODIES, LOADING(MECHANICS), FAILURE(MECHANICS) (U)
IDENTIFIERS: *WINDOWS (U)

CONICAL ACRYLIC WINDOWS OF 30-, 60-, 90-, 120-, AND 150-DEGREE INCLUDED ANGLES HAVE BEEN SUBJECTED IN THEIR MOUNTING FLANGES TO 20,000 PSI OF HYDROSTATIC PRESSURE FOR UP TO 1,000 HOURS IN THE 32F-TO-75F TEMPERATURE RANGE. THE DISPLACEMENTS OF THE WINDOWS THROUGH THE FLANGE MOUNTING HAVE BEEN RECORDED AND ARE GRAPHICALLY PRESENTED AS A FUNCTION OF TIME, TEMPERATURE, CONICAL ANGLE, AND THICKNESS-TO-DIAMETER RATIO FOR THE READY REFERENCE OF THE DESIGNER. A DETAILED STUDY HAS ALSO BEEN MADE OF THE TYPES OF FAILURE AND OF THE DIMENSIONAL AND STRUCTURAL PARAMETERS THAT MUST BE CONSIDERED IN THE DESIGN OF SAFE, OPERATIONALLY ACCEPTABLE WINDOWS FOR LONG-TERM SERVICE UNDER HYDROSTATIC PRESSURE OF 20,000 PSI. THE TEST RESULTS INDICATE THAT A MINIMUM THICKNESS TO MINOR DIAMETER RATIO OF 2 AND AN INCLUDED CONICAL ANGLE OF 90 DEGREES OR LARGER IS REQUIRED TO PROVIDE SAFE AND OPTICALLY ACCEPTABLE WINDOWS FOR LONG-TERM SUSTAINED PRESSURE LOADINGS OF 20,000 PSI. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-697 764 13/4 20/11
UTAH UNIV SALT LAKE CITY COLL OF ENGINEERING

A SURVEY ON FRACTURE OF PRESSURIZED VESSELS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
AUG 69 82P FOLIAS.E. S. I
REPT. NO. UTEC-DO-69-063
CONTRACT: F04611-67-C-0043
MONITOR: AFRPL TR-69-223

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, FRACTURE(MECHANICS)), ELASTIC SHELLS, HEMISPHERICAL SHELLS, STRESSES, CRACKS, CRACK PROPAGATION, BENDING, APPROXIMATION(MATHEMATICS), MATHEMATICAL MODELS (U)

A SURVEY OF EXISTING SOLUTIONS DESCRIBING THE STRESS DISTRIBUTION AROUND THE CRACK TIP OF AN INITIALLY CURVED SHEET IS MADE AND A METHOD FOR ESTIMATING APPROXIMATE STRESS ITENSITY FACTORS OF OTHER MORE COMPLICATED SHELL GEOMETRIES IS DISCUSSED. IN ADDITION, A FRACTURE CRITERION INCORPORATING A GEOMETRY AND PLASTICITY CORRECTION IS DERIVED FOR THE PREDICTION OF FAILURE IN FLAWED PRESSURIZED VESSELS OF ARBITRARY SHAPE. A COMPARISON WITH SOME OF THE EXISTING EXPERIMENTAL DATA IN THE LITERATURE SUBSTANTIATES ITS POTENTIAL USE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-698 282 14/2 20/1
NAVAL RESEARCH LAB ORLANDO FLA UNDERWATER SOUND REFERENCE DIV

ACOUSTIC CHARACTERISTICS OF A GLASS-FILAMENT-WOUND PRESSURE VESSEL. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
NOV 69 19P YOUNG,A. MARK ;PRANDONI, JOSEPH F. ;
REPT. NO. NRL-7013
PROJ: RF-05-111-401-4470, NRL-K03-30

UNCLASSIFIED REPORT

DESCRIPTORS: (*UNDERWATER SOUND EQUIPMENT, ELECTROACOUSTIC TRANSDUCERS), (*ELECTROACOUSTIC TRANSDUCERS, CALIBRATION), (*PRESSURE VESSELS, ACOUSTIC PROPERTIES), ANECHOIC CHAMBERS, FEASIBILITY STUDIES, FILAMENT WOUND CONSTRUCTION, GLASS TEXTILES, HYDROSTATIC PRESSURE, ACOUSTIC IMPEDANCE, MECHANICAL PROPERTIES, WALLS, REINFORCED PLASTICS, DEFECTS(MATERIALS), INTERFACES, PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: INSERTION LOSS, LININGS, EVALUATION (U)

ACOUSTIC INSERTION LOSS OF A GLASS-FILAMENT-WOUND PRESSURE VESSEL INTENDED FOR TRANSDUCER CALIBRATION VARIES SIGNIFICANTLY AS A FUNCTION OF FREQUENCY, POSITION, AND HYDROSTATIC PRESSURE. THE VARIATIONS ARE BELIEVED TO BE DUE TO VOIDS IN THE GLASS-RESIN AND IN THE GLASS-RESIN/RUBBER LINER INTERFACE, WHICH GIVE RISE TO LARGE CHANGES IN THE CHARACTERISTIC IMPEDANCE OF THE COMPOSITE WALLS AS A FUNCTION OF THE SAME VARIABLES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-699 330 18/9 18/10
ARMY ENGINEER REACTORS GROUP FORT BELVOIR VA ENGINEERING DIV

SM-1A PRESSURE VESSEL LIFETIME AS RESULT OF IN-PLACE ANNEALING. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
SEP 69 75P KNIGHTON,GEORGE W. ;
REPT. NO. ED-6922

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURIZED WATER REACTORS, *PRESSURE VESSELS), (*REACTOR SYSTEM COMPONENTS, PRESSURE VESSELS), LIFE EXPECTANCY, ANNEALING, STEEL, RADIATION DAMAGE, ARMY EQUIPMENT (U)
IDENTIFIERS: ARMY REACTORS(SM-1) (U)

THE REPORT IS PRESENTED TO COVER THE 'RECOVERY OF DUCTILITY' OF THE SM-1A REACTOR VESSEL STEEL AS A RESULT OF THE 'IN-PLACE' ANNEALING. IT DISCUSSES THE PRE-ANNEALING VESSEL LIFETIME, THE GENERAL ANNEALING TECHNIQUES USED, THE SURVEILLANCE SPECIMEN PROGRAM TO EVALUATE THE RECOVERY, THE RECOVERY ACCOMPLISHED, AND THE ESTIMATED LIFETIME OF THE ANNEALED REACTOR VESSEL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-700 233 11/4 18/8 18/10
NAVAL RESEARCH LAB WASHINGTON D C

TRENDS IN CHARPY-V SHELF ENERGY DEGRADATION AND YIELD STRENGTH INCREASE OF NEUTRON-EMBRITTLED PRESSURE VESSEL STEELS. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
DEC 69 29P HAWTHORNE,J. RUSSELL ;
REPT. NO. NRL-7011
PROJ: NRL-M01-14, RR-007-11-46-5409

UNCLASSIFIED REPORT

DESCRIPTORS: (*NUCLEAR REACTORS, MATERIALS), (*STEEL, *RADIATION DAMAGE), PRESSURE VESSELS, EMBRITTLEMENT, IMPACT TESTS, NEUTRON REACTIONS, TRANSITION TEMPERATURE, DUCTILITY, TOUGHNESS, TENSILE PROPERTIES, WELDS (U)
IDENTIFIERS: STEEL A-302-B, STEEL A-533, STEEL A-543 (U)

THE EFFECTS OF NEUTRON IRRADIATION ON CHARPY-V SHELF ENERGY AND YIELD STRENGTH WAS EXAMINED FOR THREE PRESSURE VESSEL STEEL COMPOSITIONS: A302-B, A533, AND A543. THE EFFECTS OF RADIATION EXPOSURE AT LOW TEMPERATURE (<300F (149C)) AND AT ELEVATED TEMPERATURE (550F (288 C) TO 740F (393C)) ON THE OVERALL NOTCH DUCTILITY ARE DOCUMENTED AND COMPARED. SUMMARY PLOTS SHOWING THE SIMULTANEOUS DEGRADATION IN SHELF ENERGY AND THE INCREASE OF YIELD STRENGTH LEVELS BROADLY ILLUSTRATE THE PROGRESSIVE CHANGE FROM DUCTILE FRACTURE PERFORMANCE TO RELATIVELY BRITTLE CHARACTERISTICS. (AUTHOR) (U)

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-702 600 13/4
DEFENSE DOCUMENTATION CENTER ALEXANDRIA VA

PRESSURE VESSELS. VOLUME I. (U)

DESCRIPTIVE NOTE: REPORT BIBLIOGRAPHY JAN 63-JUN 69.
MAR 70 114P
REPT. NO. DDC-TAS-70-22-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-866 750.

DESCRIPTORS: (*PRESSURE VESSELS, *BIBLIOGRAPHIES), STRUCTURES, MATERIALS, MECHANICAL PROPERTIES, FILAMENT WOUND CONSTRUCTION, TANKS(CONTAINERS), RAMJET ENGINES, PLASMA JETS, REACTOR MATERIALS, POWER REACTORS, SUBMARINE HULLS, MECHANICAL WORKING, ROCKET CASES, METALLURGY (U)
IDENTIFIERS: CONTAINMENT VESSELS, FRACTOGRAPHIC DATA, ELECTRON FRACTOGRAPHY (U)

THE ANNOTATED BIBLIOGRAPHY COMPRISES CITATIONS OF UNCLASSIFIED REPORTS DEALING WITH TESTS AND APPLICATIONS OF PRESSURE VESSELS USED FOR TANKS (CONTAINERS), SUBMARINE HULLS, ROCKET CASES, RAMJET ENGINES AND GUIDED MISSILES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-702 731 14/2 13/12 13/10
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

IMPLOSIONS IN PRESSURE VESSELS, EXPERIMENTAL RESULTS. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUL 65-JUN 66,
FEB 70 88P KUSANO,HAROLD M. ;
REPT. NO. NCEL-TN-1059
PROJ: YR009-03-01-004

UNCLASSIFIED REPORT

DESCRIPTORS: (*UNDERWATER VEHICLES, STRUCTURAL PROPERTIES), (*TEST FACILITIES, PRESSURE VESSELS), (*PRESSURE VESSELS, STRESSES), SAFETY, SHOCK WAVES, PRESSURE, PREDICTIONS, RESPONSE, O-RINGS, DAMAGE ASSESSMENT (U)
IDENTIFIERS: *IMPLOSIONS (U)

PRESSURE VESSELS WERE SUBJECTED TO IMPLOSION-GENERATED HYDRODYNAMIC PRESSURES/IMPULSES. THE EXPERIMENTAL RESULTS INDICATE THE HYDRODYNAMIC PRESSURE AND THE DYNAMIC RESPONSE OF THE PRESSURE VESSEL VARY, DEPENDING UPON (1) MODEL SIZE, (2) IMPLOSION PRESSURE, AND/OR (3) DISTANCE FROM IMPLOSION; GRAPHS SHOWING THESE RELATIONSHIPS ARE PRESENTED. IMPLOSION PRESSURES UP TO 19,000-PSI WERE OBTAINED. THE HIGHER IMPLOSION PRESSURES OCCURRED IN THE 20,000 PSI PRESSURE VESSEL AND CAUSED DAMAGE TO O-RINGS AND MOUNTING FACILITIES INSIDE THE PRESSURE VESSEL, AND LOOSENED PIPE CONNECTIONS FROM THE TOP COVER PLUG. HIGH-SPEED MOTION PICTURES SHOWED THAT THE COLLAPSE OF AIR CAVITIES WAS GENERALLY ASYMMETRIC AND INCONSISTENT. THE CRITICAL MODEL SIZES FOR MAXIMUM PRESSURE DROP OR ENERGY RELEASE IN PRESSURE VESSELS WERE DETERMINED. THE EFFECTS OF IMPLOSION ON PRESSURE VESSELS CAN BE REDUCED GREATLY BY FILLING THE TEST SPHERE WITH WATER. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-703 834 13/4 20/11

LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED RESEARCH LAB

FORMULAS AND METHODS USED IN THE ANALYSIS OF PRESSURE VESSELS, (U)

70 62P KURAL,MURAT ;

REPT. NO. LMSC-4-11-66-5

UNCLASSIFIED REPORT

DESCRIPTORS: (*PROPELLANT TANKS, DESIGN), (*PRESSURE VESSELS, STRESSES), STRUCTURAL SHELLS, CONICAL BODIES, CYLINDRICAL BODIES, RINGS, LOADING(MECHANICS), MATHEMATICAL ANALYSIS, DEFORMATION, TABLES (U)

THE PURPOSE OF THIS REPORT IS TO MAKE AVAILABLE A COMPACT SUMMARY OF THE FORMULAS AND METHODS USED IN THE STRESS ANALYSIS OF THIN PRESSURE VESSELS. THE FIRST PART DEALS ONLY WITH MEMBRANE FORCES AND DEFORMATIONS RESULTING FROM PRESSURE LOADING IN SHELLS OF REVOLUTION. THE FORMULAS ASSOCIATED WITH AXISYMMETRIC EDGE LOADINGS ARISING FROM DISCONTINUITIES IN THE STRUCTURE HAVE BEEN TREATED IN THE SECOND PART. THE LAST PART OF THE REPORT IS CONCERNED WITH METHODS TO PREDICT UNKNOWN EDGE (DISCONTINUITY) FORCES AND MOMENTS AT JUNCTURES OF SHELLS. THE ENTIRE FORMULATION IS RESTRICTED TO PRESSURE VESSELS WHERE SHELL COMPONENTS FALL INTO THE CATEGORY OF 'THIN,' 'STEEP,' AND CONSTANT THICKNESS SHELLS OF REVOLUTION. FURTHERMORE, NO COUPLING OF EDGE EFFECTS IS ALLOWED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-703 963 18/10
NAVAL RESEARCH LAB WASHINGTON D C

STEELS FOR COMMERCIAL NUCLEAR POWER REACTOR PRESSURE VESSELS. (U)

JUN 69 49P STEELE,L. E. ISTERNE,R. H. , JR;

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN NUCLEAR ENGINEERING AND DESIGN. V10 P259-307 1969.

DESCRIPTORS: (*POWER REACTORS, PRESSURE VESSELS), (*PRESSURE VESSELS, *STEEL), SPECIFICATIONS, MECHANICAL PROPERTIES, MICROSTRUCTURE, MANUFACTURING METHODS (U)

THE PURPOSE OF THE REPORT IS TO DESCRIBE AND CHARACTERIZE THE CARBON AND LOW-ALLOY STEELS WHICH HAVE BEEN USED OR ARE ANTICIPATED FOR USE IN NUCLEAR REACTOR PRESSURE VESSELS. THE SCOPE IS PURPOSELY LIMITED TO MATERIALS AND ENVIRONMENTAL INFLUENCES UPON THE PROPERTIES OF THESE MATERIALS. THROUGH THE DATA ARE ORIENTED TOWARD THE REACTOR PRESSURE VESSEL. MUCH OF THE INFORMATION IS APPLICABLE TO AUXILIARY COMPONENTS SUCH AS STEAM GENERATORS AND PRESSURIZERS. ENGINEERING CONSIDERATIONS ARE REFERENCED ONLY IN THE INTEREST OF FURTHERING THE BASIC AIM OF MATERIALS CHARACTERIZATION.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-704 787 13/4 20/11 9/2
NAVAL ORDNANCE LAB WHITE OAK MD

COMPUTER PROGRAM FOR A MONOBLOC, HOLLOW, CLOSED-END CYLINDER SUBJECTED TO INTERNAL PRESSURE. (U)

FEB 70 43P DAWSON,VICTOR C. D. ;
REPT. NO. NOLTR-70-41

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, STRUCTURAL PROPERTIES), (*STRESSES, MATHEMATICAL MODELS), COMPUTER PROGRAMS, STRAIN(MECHANICS), PLASTICITY, YIELD POINT, CYLINDRICAL BODIES (U)
IDENTIFIERS: COMPUTER ANALYSIS, COMPUTERIZED SIMULATION, AUTOFRETTAGE (U)

THIS REPORT DESCRIBES A COMPUTER PROGRAM WRITTEN IN BASIC LANGUAGE WHICH CALCULATES THE STRESSES AND STRAINS IN A MONOBLOC, HOLLOW, CLOSED-END CYLINDER SUBJECTED TO INTERNAL PRESSURE. EXAMPLES OF TYPICAL CALCULATIONS ARE GIVEN, INCLUDING, AMONG OTHERS, CONDITIONS THAT CAUSE AUTOFRETTAGE AND REVERSE YIELDING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-705 125 13/4 13/10
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

PRESSURE VESSEL CONCEPTS: EXPLORATORY EVALUATION OF STACKED-RING AND SEGMENTED-WALL DESIGNS WITH TIE-ROD END-CLOSURE RESTRAINTS. (U)

DESCRIPTIVE NOTE: FINAL REPT. OCT 64-OCT 65,
MAR 70 99P STACHIW,J. D. ;
REPT. NO. NCEL-TR-666
PROJ: YR009-03-01-004

UNCLASSIFIED REPORT

DESCRIPTORS: (*UNDERWATER VEHICLES, PRESSURE VESSELS), (*PRESSURE VESSELS, DESIGN), HYDROSTATIC PRESSURE, CYLINDRICAL BODIES, LAMINATED PLASTICS, BOLTED JOINTS, MANUFACTURING METHODS, MARAGING STEELS, STRESSES, PHOTOELASTICITY (U)

AN EXPLORATORY EXPERIMENTAL STUDY WAS CONDUCTED TO EVALUATE THE STACKED-RING AND SEGMENTED-WALL PRESSURE VESSEL CONCEPTS. THE EVALUATION CONSISTED OF TESTING TO DESTRUCTION STACKED-RING AND SEGMENTED-WALL PRESSURE VESSEL MODELS WITH TIE-ROD END-CLOSURE RESTRAINTS AND EVALUATING A SERIES OF SEAL DESIGNS UTILIZED IN THE SEALING OF THE JOINTS BETWEEN THE PRESSURE VESSEL END CLOSURES AND THE CYLINDRICAL PRESSURE VESSEL BODY. THE TEST RESULTS INDICATE THAT THE STACKED-RING PRESSURE VESSEL DESIGN IS APPROXIMATELY 50% HEAVIER THAN A MULTILAYERED PRESSURE VESSEL OF SAME INTERNAL DIAMETER LENGTH, MATERIAL, AND PRESSURE CAPABILITY. THE SEGMENTED-WALL PRESSURE VESSEL DESIGN IS APPROXIMATELY 8 TO 9 TIMES HEAVIER THAN A MULTILAYERED PRESSURE VESSEL OF SAME DIAMETER, LENGTH, MATERIAL, AND PRESSURE CAPABILITY. THE FREE-FLOATING, SELF-ENERGIZING RADIAL SEAL SYSTEM PROVIDED THE MOST RELIABLE AND EXTRUSION-PROOF SEALING FOR VESSELS WITH CONSIDERABLE RADIAL DILATION AND AXIAL END-CLOSURE MOVEMENT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-706 713 13/4 20/13
NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF

HEAT TRANSFER CONSIDERATIONS IN A PRESSURE VESSEL BEING CHARGED. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
JUN 69 102P LYONS,JOHN THOMAS , III:

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, PRESSURIZATION), (*PRESSURIZATION, *HEAT TRANSFER), GAS CYLINDERS, CONVECTION(HEAT TRANSFER), ADIABATIC GAS FLOW, NUMERICAL ANALYSIS, SPECIFIC HEAT, DIFFERENTIAL EQUATIONS, EXPERIMENTAL DATA, THESES (U)

EXPERIMENTAL DATA FOR THE CHARGING OF AN AIR RECEIVER IS PRESENTED AND INTERPRETED IN DETAIL. THE DATA INDICATES A SUBSTANTIAL DEPARTURE FROM THE ADIABATIC BEHAVIOR. THE EXPERIMENTAL RESULTS ARE USED TO EVALUATE EXISTING CLOSED FORM EXPRESSIONS FOR THE THERMODYNAMIC STATE OF A GAS IN A RECEIVER. A METHOD FOR EXPERIMENTALLY DETERMINING THE CONVECTIVE HEAT TRANSFER COEFFICIENT IS DEVELOPED, EVALUATED AND USED IN CONJUNCTION WITH THESE EXPRESSIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-707 336 18/10 18/8 11/6
NAVAL RESEARCH LAB WASHINGTON D C

IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. 1 FEB-30 APR 70,
MAY 70 54P STEELE,L. E. ;SERPAN,C. Z. , JR.;HAWTHORNE,J. R. ;KRAFFT,J. M. ; GRAY,R. A. , JR;
REPT. NO. NRL-MR-2126
PROJ: NRL-M01-14, RR007-11-41-5409
TASK: AT(49-5)-2110

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO QUARTERLY PROGRESS REPT., AD-703 617.

DESCRIPTORS: (*REACTOR MATERIALS, RADIATION DAMAGE), (*STEEL, REACTOR MATERIALS), EMBRITTLEMENT, POWER REACTORS, PRESSURE VESSELS, REACTOR FUEL CLADDING, FAST REACTORS, FRACTURE(MECHANICS), NEUTRON REACTIONS, VANADIUM (U)

THE REPORT INCLUDES: (1) RESULTS OF A DAMAGE FUNCTION APPROACH TO SPECTRUM ANALYSIS FOR ARMY REACTOR SM-1, (2) ANALYSIS FOR FRACTURE RESISTANCE IN HEAVY THICKNESS A533-B STEEL PLATE AND WELD METAL, (3) THE ROLE OF IRON IN THE FRACTURE OF AN IRRADIATED PRESSURE VESSEL STEEL, (4) THE NATURE OF OBSERVED RADIATION DAMAGE IN VANADIUM, AND (5) THE EFFECTS OF THE FAST REACTOR ENVIRONMENT ON THE TENSILE PROPERTIES OF SELECTED STRUCTURAL AND CLADDING ALLOYS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-707 363 13/10 11/9
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

DEVELOPMENT OF A SPHERICAL ACRYLIC PLASTIC PRESSURE HULL FOR HYDROSPACE APPLICATION. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. OCT 64-OCT 69,
APR 70 222P STACHIW,J. D. ;
REPT. NO. NCEL-TR-676
PROJ: YF38.535.005.006

UNCLASSIFIED REPORT
PORTIONS OF THIS DOCUMENT ARE NOT FULLY LEGIBLE.
SUPPLEMENTARY NOTE: LIMITED NUMBER OF COPIES CONTAINING COLOR OTHER THAN BLACK AND WHITE ARE AVAILABLE UNTIL STOCK IS EXHAUSTED. REPRODUCTIONS WILL BE MADE IN BLACK AND WHITE ONLY.

DESCRIPTORS: (*UNDERWATER VEHICLES, PRESSURE VESSELS), (*HULLS(MARINE), ACRYLIC RESINS), PHYSICS LABORATORIES, DESIGN, CONTINENTAL SHELVES, DEEP SUBMERGENCE, SPHERES, MANNED, OPERATION, CONSTRUCTION MATERIALS, PROTECTION, SAFETY, PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: *NEMO(NAVAL EXPERIMENTAL MANNED OBSERVATORY), *NAVAL EXPERIMENTAL MANNED OBSERVATORY (U)

A SPHERICAL, ACRYLIC PLASTIC CAPSULE HAS BEEN DESIGNED FOR PROTECTION OF MAN AGAINST THE EXTERNAL HYDROSTATIC PRESSURE PRESENT AT CONTINENTAL SHELF DEPTHS. EXPERIMENTAL AND ANALYTICAL STUDIES HAVE BEEN CONDUCTED TO EVALUATE THE PERFORMANCE OF BOTH THE SPHERICAL CAPSULE DESIGN AND THE ACRYLIC PLASTIC CONSTRUCTION MATERIAL AT CONTINENTAL SHELF DEPTHS. RESULTS FROM TESTING TWENTY-TWO 15-INCH-OUTSIDE DIAMETERMODELS AND A LARGE-SCALE PROTOTYPE UNDER SHORT-TERM, CYCLIC, AND LONG-TERM HYDROSTATIC PRESSURE INDICATE THAT THE DESIGN AND MATERIAL CHOSEN MEET THE REQUIREMENTS FOR SAFE OPERATION AT CONTINENTAL SHELF DEPTHS. A PROTOTYPE 66-INCH-OD CAPSULE OF 2.5-INCH WALL THICKNESS, AND 4,000-POUND POSITIVE BUOYANCY IN SEAWATER HAS BEEN SPECIFICALLY DEVELOPED FOR THE NEMO (NAVAL EXPERIMENTAL MANNED OBSERVATORY) SYSTEM. THE NEMO PROTOYYPE CAPSULE SUCCESSFULLY WITHSTOOD 105 SIMULATED DIVES RANGING FROM 250 TO 2,400 FEET PRIOR TO BEING TESTED TO IMPLOSION AT A SIMULATED DEPTH OF 4,150 FEET. UNTIL MORE EXPERIMENTAL DATA ARE GENERATED ON THE FATIGUE LIFE OF THE FULL SCALE NEMO CAPSULE UNDER DIFFERENT PRESSURE LOADINGS. (U)

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-708 868 13/4 20/11
WATERVLIET ARSENAL N Y

A COMPLIANCE K CALIBRATION FOR A PRESSURIZED THICK-WALL CYLINDER WITH A RADIAL CRACK. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 70 34P UNDERWOOD,JOHN H. ;LASSELLE,
RALPH R. ;SCANLON,RAYMOND D. ;HUSSIAN,MOAYYED
A. ;
REPT. NO. WVT-7026
PROJ: DA-1-T-061102-B-32-A

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, STRESSES), CYLINDRICAL BODIES, CRACKS, PRESSURE, NUMERICAL ANALYSIS, LOADING(MECHANICS), NOTCH TOUGHNESS, TEST METHODS (U)
IDENTIFIERS: K CALIBRATIONS, STEEL 4340, FRACTURE MECHANICS (U)

THE K CALIBRATION FOR AN INTERNALLY PRESSURIZED, THICK-WALL CYLINDER WITH A STRAIGHT, RADIAL NOTCH HAS BEEN DETERMINED FROM A COMPLIANCE TEST. THE METHOD SUGGESTED BY IRWIN IS USED WITH COMPLIANCE DEFINED AS THE CHANGE IN INTERNAL VOLUME OF A CYLINDER DIVIDED BY APPLIED HYDROSTATIC PRESSURE RATHER THAN THE USUAL LOAD-ELONGATION DEFINITION. THE DERIVATIVE OF INTERNAL VOLUME CHANGE WITH RESPECT TO NOTCH DEPTH, 'A', IS OBTAINED BY NUMERICAL ANALYSIS OF TANGENTIAL STRAIN MEASUREMENTS ON THE OD OF THE TEST CYLINDER. THIS DERIVATIVE LEADS DIRECTLY TO THE K CALIBRATION FOR THE CYLINDER. CUBIC SPLINE FUNCTIONS ARE USED TO APPROXIMATE BOTH THE STRAIN AS A FUNCTION OF POSITION ON THE CYLINDER AND THE RESULTING VOLUME CHANGE AS A FUNCTION OF 'A'. ALSO INCLUDED IN THE DETERMINATION OF K IS A PROOF, USING THE DIVERGENCE THEOREM IN THE THEORY OF ELASTICITY, THAT THE DERIVATIVES WITH RESPECT TO 'A' OF INTERNAL AND EXTERNAL VOLUME CHANGE ARE IDENTICAL. THIS ALLOWS THE USE OF EXTERNAL STRAIN MEASUREMENTS TO DETERMINE K BASED ON INTERNAL VOLUME CHANGE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-709 446 13/4 13/13 20/11
NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER WASHINGTON D C

STRESS ANALYSIS OF THIN ELASTOPLASTIC SHELLS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
MAY 70 111P LOMACKY,OLES I
REPT. NO. NSRDC-3295
PROJ: SF013-03-02
TASK: 1954

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, STRUCTURAL SHELLS), (*STRUCTURAL SHELLS, STRESSES), PLASTICITY, STRAIN(MECHANICS), SHEAR STRESSES, DEFORMATION, DIFFERENTIAL EQUATIONS, NUMERICAL ANALYSIS, SUBMARINE HULLS (U)
IDENTIFIERS: FINITE DIFFERENCE ANALYSIS (U)

A STRESS ANALYSIS IS PRESENTED OF THIN SHELLS, HAVING LARGE DEFLECTIONS AND BEING LOADED INTO THE STRAIN-HARDENING RANGE. PLASTIC STRAIN INCOMPRESSIBILITY IS ASSUMED. THE TWO GOVERNING DIFFERENTIAL EQUATIONS IN TERMS OF THE STRESS FUNCTION AND THE NORMAL DISPLACEMENT ARE PRESENTED IN TWO ALTERNATE FORMS. IN THE FIRST FORM CORRESPONDING EQUATIONS OF THE ELASTIC PROBLEM ARE MODIFIED ONLY BY ADDING THE INTEGRALS OF THE PLASTIC STRAINS. THE ALTERNATE FORM REQUIRES THAT THE COEFFICIENTS OF THE DIFFERENTIAL EQUATION OPERATORS BECOME DEPENDENT ON THE LOAD, AND AN ITERATIVE PROCESS IS PRESENTED BY WHICH THE SOLUTION CAN BE OBTAINED, STARTING FROM THE KNOWN ELASTIC SOLUTION. UTILIZING THE FIRST FORM, THE ANALYSIS IS APPLIED TO THE PROBLEM OF STRESS CONCENTRATION AROUND A CIRCULAR OPENING, WITH AND WITHOUT A REINFORCED RING IN A PRESSURIZED SPHERICAL SHELL. NUMERICAL SOLUTION IS OBTAINED BY AN ITERATIVE PROCEDURE, USING THE FINITE DIFFERENCE TECHNIQUE FOR THE SPECIAL CASE OF LINEARIZED DISPLACEMENTS AND DEFORMATION THEORY OF PLASTICITY. THE SPEED OF CONVERGENCE DECREASES WITH INCREASE IN PRESSURE AND DECREASE OF STRAIN-HARDENING COEFFICIENT. THE PROCEDURE REQUIRED TO APPLY THE INCREMENTAL THEORY AND TO INCLUDE FINITE DISPLACEMENTS IS ALSO DISCUSSED IN DETAIL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-709 554 18/10
NAVAL RESEARCH LAB WASHINGTON D C

THE INFLUENCE OF COMPOSITION ON THE FRACTURE TOUGHNESS OF COMMERCIAL NUCLEAR VESSEL WELDS. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
JUN 70 22P STEELE,LENDELL E. ;
REPT. NO. NRL-7095
CONTRACT: AT(49-5)-2110
PROJ: RR007-11-41

UNCLASSIFIED REPORT

DESCRIPTORS: (*NUCLEAR POWER PLANTS, PRESSURE VESSELS), (*PRESSURE VESSELS, EMBRITTLEMENT), METAL JOINTS, WELDS, FRACTURE(MECHANICS), TOUGHNESS, RADIATION DAMAGE, STATISTICAL DATA (U)
IDENTIFIERS: FRACTURE MECHANICS, RADIATION EMBRITTLEMENT, STEEL A302-B, STEEL A533-B, ELECTROSLAG WELDING (U)

IRRADIATION STUDIES OF WELDS OF THE ASTM TYPE A302-B AND A533-B STEELS, MOST COMMONLY USED FOR COMMERCIAL WATER REACTOR VESSELS, DEMONSTRATED SEVERAL INSTANCES IN WHICH THE WELD METAL EXHIBITED LOWER FRACTURE TOUGHNESS OR GREATER ELEVATION OF THE BRITTLE-TO-DUCTILE TRANSITION TEMPERATURE THAN THAT OBSERVED FOR THE COMPANION BASE-PLATE AND WELD HEAT-AFFECTED-ZONE MATERIAL. EXAMINATION OF THE STRUCTURE AND COMPOSITION LED TO THE CONCLUSION THAT COMPOSITION IS CRITICAL TO THE LEVEL OF RADIATION-INDUCED EMBRITTLEMENT. THE LEVEL OF COPPER AND PHOSPHORUS CONTENTS HAS BEEN SHOWN TO BE ESPECIALLY CRITICAL TO THE LEVEL OF EMBRITTLEMENT WITH WELDS HAVING HIGH COPPER (>0.20%) AND PHOSPHORUS (> 0.015%) SHOWING GREATER EMBRITTLEMENT THAN THOSE CONTAINING LESSER AMOUNTS. THESE EXPERIMENTAL OBSERVATIONS WERE VERIFIED THROUGH LABORATORY TESTS IN WHICH THESE CONSTITUENTS AND OTHER RESIDUAL ELEMENTS WERE CONTROLLED IN WELDMENTS SIMULATING THOSE FOR REACTOR SERVICE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-709 898 18/9 11/6
NAVAL RESEARCH LAB WASHINGTON D C

ANALYSIS OF NEUTRON-EMBRITTLEMENT AND FLUX-DENSITY CONSIDERATIONS OF THE ARMY SM-1 REACTOR PRESSURE VESSEL. (U)

JUN 70 24P SERPAN,CHARLES Z., JR.

REPT. NO. NRL-7101
PROJ: NRL-M01-14, USA-ERG-11-69

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURIZED WATER REACTORS, PRESSURE VESSELS), (*STEEL, EMBRITTLEMENT), NEUTRON FLUX, DOSIMETERS, NEUTRON SPECTRUM, TEMPERATURE, POWER REACTORS, STATISTICAL ANALYSIS, TRANSITION TEMPERATURE, REACTOR SYSTEM COMPONENTS (U)
IDENTIFIERS: FLUENCE, STEEL A-212, SM-1A REACTORS (U)

THE ARMY SM-1 REACTOR HAS BEEN EVALUATED WITH RESPECT TO THE INCREASE IN TRANSITION TEMPERATURE OF THE A212-B STEEL PRESSURE VESSEL. ALTHOUGH STEEL FROM THE HEAT FORMING THE VESSEL IS NOT AVAILABLE FOR IRRADIATION-RESPONSE BEHAVIOR TESTING, THE INITIAL TRANSITION TEMPERATURE OF 40 DEG F (4 DEG C) WAS DETERMINED FROM VESSEL STEEL. A RELATIONSHIP BETWEEN INCREASING EMBRITTLEMENT FOR A 4-IN.-THICK PLATE OF A212-B STEEL, REPRESENTING THE ASTM REFERENCE HEAT FOR THIS COMPOSITION, AND INCREASING NEUTRON FLUENCE WAS ESTABLISHED FOR THE IRRADIATION TEMPERATURE CONDITIONS OF THE SM-1 REACTOR. COMBINING WITH THIS THE ARMY-IMPOSED TRANSITION TEMPERATURE LIMIT FOR THE SM-1 REACTOR VESSEL OF 295 DEG F (146 DEG C) RESULTS IN A FLUENCE VALUE OF 2.65 X 10 TO THE 19TH POWER N/SQ.CM. > 0.5 MEV FOR A LIFETIME VESSEL EXPOSURE. THE NEUTRON FLUX LEVEL FOR THE VESSEL WAS ESTABLISHED BY EXTRAPOLATING A CORE-REGION FLUX MEASUREMENT USING THE RESULTS OF A CALCULATED NEUTRON SPECTRUM AT THE REACTOR VESSEL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-711 321 18/10 11/6
NAVAL RESEARCH LAB WASHINGTON D C

IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. 1 MAY-31 JUL 70.
AUG 70 36P STEELE,L. W. ;HAWTHORNE,J. R. ;SERPAN,C. Z. , JR.;SMIDT,F. A. , JR.;
REPT. NO. NRL-MR-2153
CONTRACT: AT(49-5)-2110
PROJ: RR007-11-41-5409, NRL-M01-14

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-707 336.

DESCRIPTORS: (*REACTOR MATERIALS, RADIATION DAMAGE), (*STEEL, RADIATION DAMAGE), (*VANADIUM, RADIATION DAMAGE), FRACTURE(MECHANICS), PRESSURE VESSELS, NEUTRON REACTIONS, EMBRITTLEMENT (U)
IDENTIFIERS: STEEL A-533B (U)

THE REPORT INCLUDES: (1) ASSESSMENTS OF RADIATION RESISTANT A533-B PLATE FROM A CONTROLLED COMPOSITION 30-TON DEMONSTRATION MELT, (2) A STUDY OF THROUGH-THICKNESS DUCTILITY IN AN IRRADIATED REACTOR VESSEL WALL, (3) NEUTRON EMBRITTLEMENT IN A SIMULATED REACTOR PRESSURE VESSEL WALL, AND (4) FUNDAMENTAL EXPLORATION OF RADIATION DAMAGE IN VANADIUM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-711 845 11/6 18/10
NAVAL RESEARCH LAB WASHINGTON D C

A REASSESSMENT OF FRACTURE-SAFE OPERATING CRITERIA FOR REACTOR VESSEL STEELS BASED ON CHARPY-V PERFORMANCE. (U)

DESCRIPTIVE NOTE: SPECIAL INTERPRETATIVE REPT.,
SEP 70 29P LOSS,F. J. ;HAWTHORNE,J.
R. ;SERPAN,C. Z. , JR;
REPT. NO. NRL-7152
CONTRACT: AT(49-5)-2110
PROJ: NRL-M01-14, RR007-11-41-5409

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, FRACTURE(MECHANICS)),
(*PRESSURE VESSELS, NUCLEAR REACTORS), SAFETY,
TESTS, TRANSITION TEMPERATURE, DESIGN (U)
IDENTIFIERS: STEEL A-533B, TEAR TESTS (U)

FRACTURE-SAFE OPERATING CRITERIA FOR COMMERICAL NUCLEAR PRESSURE VESSELS BASED ON FRACTURE ANALYSIS DIAGRAM PROCEDURES AND CHARPY-V ENERGY TRENDS ARE REAPPRAISED WITH RESPECT TO THE EFFECTS OF THICK-SECTION MECHANICAL CONSTRAINT AND LOW CHARPY-V SHELF ENERGIES RESULTING FROM NEUTRON IRRADIATION. COMPARISONS OF THE CHARPY-V TEST WITH THE MORE DEFINITIVE DYNAMIC TEAR TEST PROCEDURES INDICATE THE FORMER TO BE AN ACCEPTABLE MEANS OF ASSESSING THE FRACTURE TOUGHNESS OF A533-B STEEL. THE MECHANICAL CONSTRAINT ASSOCIATED WITH 12-IN. THICKNESSES OF THIS STEEL SUGGESTS THE ADDITION OF 70F (39C) TO THE EXISTING CRITERION REQUIRING VESSEL OPERATION ABOVE NDT + 60F (33C). RATIO ANALYSIS DIAGRAM PROCEDURES ARE SHOWN TO BE USEFUL IN INTERPRETING CHARPY-V SHELF LEVEL DATA OBTAINED FROM VESSEL SURVEILLANCE PROGRAMS IN TERMS OF CRITICAL TOUGHNESS LEVELS RELATING TO BRITTLE FRACTURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-713 258 20/11
CALIFORNIA UNIV BERKELEY

ELASTIC-PLASTIC ANALYSIS OF SOME PRESSURE VESSEL HEADS. (U)

JUL 69 11P POPOV,E. P. ;KHOJASTEH-BAKHT,M. ;SHARIFI,P. ;

CONTRACT: DAHC04-69-C-0037
MONITOR: AROD 828411-A

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF ENGINEERING FOR INDUSTRY, TRANSACTIONS OF THE ASME, P309-316 MAY 70.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH ILLINOIS UNIV., CHICAGO. DEPT. OF MATERIALS ENGINEERING. PRESENTED AT THE WINTER ANNUAL MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, LOS ANGELES, CALIF., 16-20 NOV 69. PAPER NO. 69-WA/PVP-7.

DESCRIPTORS: (*STRUCTURAL SHELLS, ELASTICITY), (*PRESSURE VESSELS, ELASTICITY), LOADING(MECHANICS), STRESSES, BUCKLING(MECHANICS), MATHEMATICAL ANALYSIS (U)
IDENTIFIERS: FINITE ELEMENT ANALYSIS, ELASTOPLASTICITY (U)

SIXTEEN ASME STANDARD TORISPHERICAL HEADS ATTACHED TO CYLINDERS AND SUBJECTED TO INTERNAL PRESSURE ARE ANALYZED AS ELASTIC AND/OR ELASTIC-PLASTIC SHELLS USING A NEW FINITE ELEMENT, AS BASIC ELEMENTS, THIN-WALLED FRUSTA WITH CURVED MERIDIANS HAVING COMMON TANGENTS AND RADII AT THE NODAL CIRCLES ARE EMPLOYED ASSURING GOOD ACCURACY OF THE RESULTS. IN THE PLASTIC ANALYSIS EACH WALL-THICKNESS WAS SUBDIVIDED INTO CONCENTRIC LAMINA IN ORDER TO MONITOR THE BEHAVIOR OF THE MATERIAL. THE INCREMENTAL LAW OF PLASTICITY IN CONJUNCTION WITH THE MISES YIELD CONDITION AND THE ASSOCIATED FLOW RULE WERE USED IN THE INELASTIC RANGE. THE RESULTS OF THE ANALYSIS ARE PRESENTED IN DETAIL AND ARE COMPARED WITH THE PROVISIONS OF THE ASME PRESSURE VESSEL CODE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO: /ZOM07

AD-713 519 1976 20/11
WATERVLIET ARSENAL N Y

THE ROLE OF FRACTURE TOUGHNESS AND RESIDUAL STRESSES IN THE FATIGUE AND FRACTURE BEHAVIOR OF LARGE THICK-WALLED PRESSURE VESSELS. (U)

70 15P DAVIDSON,THOMAS E. ;THROOP, JOSEPH F. ;REINER,ALBERT N. ;

UNCLASSIFIED REPORT

DESCRIPTORS: (*GUN BARRELS, FRACTURE(MECHANICS)), PRESSURE VESSELS, STRESSES, FATIGUE(MECHANICS), CRACKS, CRACK PROPAGATION, PRESSURE, HYDRAULIC SYSTEMS, TEST METHODS (U)
IDENTIFIERS: AUTOFRETTAGE (U)

SUMMARIZED ARE THE RESULTS OF AN INVESTIGATION INTO THE FATIGUE AND FRACTURE BEHAVIOR OF LARGE THICK-WALLED CYLINDERS IDENTICAL IN CONFIGURATION TO A 175MM CANNON TUBE. CRACK GROWTH RATES AND FATIGUE LIFE DATA ARE PRESENTED FOR MATERIALS OF THREE STRENGTH LEVELS AND DIFFERENT FRACTURE TOUGHNESS LEVELS. THE EFFECTS OF AUTOFRETTAGE WERE EXAMINED AND FOUND TO IMPROVE THE FATIGUE LIFE SIGNIFICANTLY. THIS IMPROVEMENT IN LIFE IS SHOWN TO BE THE RESULT OF RETARDATION OF THE FATIGUE CRACK GROWTH RATE AT SMALL CRACK DEPTHS. THIS OBSERVATION, ALONG WITH THE RELATIONSHIP BETWEEN FRACTURE TOUGHNESS, CRITICAL CRACK DEPTH AND FRACTURE MODE, IS INTERPRETED IN TERMS OF RECENT ADVANCEMENTS IN THE APPLICATION OF FRACTURE MECHANICS TO THE CASE OF A CYLINDER UNDER INTERNAL PRESSURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-714 178 20/11 13/4
APPLIED TECHNOLOGY ASSOCIATES INC EMERSON N J

ANALYSIS OF A CIRCULAR CYLINDRICAL PERFORMATED SHELL. (U)

NOV 69 88P MAHONEY,J. B. ;RUNG,R. I

REPT. NO. ATA-129-E-11-69
CONTRACT: N00024-68-C-5151

UNCLASSIFIED REPORT

DESCRIPTORS: (*STRUCTURAL SHELLS, ORIFICES), (*ORIFICES, STRESSES), (*PRESSURE VESSELS, DESIGN), CYLINDRICAL BODIES, STIFFENED CYLINDERS, BENDING, ELASTICITY, COMPUTER PROGRAMS (U)
IDENTIFIERS: FORTRAN (U)

THE REPORT CONTAINS A SUMMARY OF THE WORK DONE UNDER A CONTINUING RESEARCH CONTRACT GIVEN TO APPLIED TECHNOLOGY ASSOCIATES IN THE FIELD OF PRESSURE VESSEL DESIGN. IN PARTICULAR IS DEVELOPED THE THEORETICAL SOLUTION FOR THE DISTRIBUTION OF STRESSES IN A PERFORATED CYLINDRICAL SHELL. THESE CALCULATIONS HAVE BEEN REDUCED TO COMPUTER CODES AND ARE GIVEN IN THE APPENDIX OF THE REPORT. IN ADDITION TO THE COMPUTER CODES DEVELOPED FOR THE EFFECTIVE ELASTIC CONSTANTS, THE REPORT CONTAINS A CODE FOR THE ANALYSIS OF A CIRCULAR CYLINDRICAL SHELL WHOSE SURFACE IS PENETRATED ONLY OVER A PORTION. THUS THE 'EQUIVALENT' ELASTIC CONSTANTS OBTAINED CAN BE USED WITHIN THE SHELL THEORY DEVELOPED IN THE REPORT TO DESCRIBE THE DEFLECTIONS AND STRESSES IN A PARTIALLY PERFORATED SHELL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-714 662 11/6 20/12 13/4
AEROSPACE CORP EL SEGUNDO CALIF LAB OPERATIONS

THE EFFECT OF PROCESSING ON PLASTIC STRAIN ANISOTROPY OF TI-6AL-4V, (U)

SEP 70 25P AMATEAU,MAURICE F. ;DULL, DENNIS L. ;RAYMOND,LOUIS ;
REPT. NO. TR-0059(6250-10)-5
CONTRACT: F04701-70-C-0059
MONITOR: SAMSO TR-70-380

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, PLASTICITY), (*PRESSURE VESSELS, MANUFACTURING METHODS), ELASTICITY, ANISOTROPY, STRAIN HARDENING, LOADING(MECHANICS) (U)
IDENTIFIERS: TITANIUM ALLOY 6AL 4V (U)

THE PLASTIC STRAIN ANISOTROPY OF TI-6AL-4V WAS EXAMINED AFTER VARIOUS THERMO-MECHANICAL TREATMENTS, INCLUDING HEAT TREATING, ROLLING, AND FORGING. THE PROCESSING TEMPERATURES WERE VARIED FROM ROOM TEMPERATURE TO 1950F. THE ANISOTROPY, IN TERMS OF THE STRAIN RATIO R, WAS MEASURED BY POST-YIELD STRAIN GAGES IN THE THREE PRINCIPAL DIRECTIONS. THE RESULTS WERE CORRELATED WITH THE (0002) POLE FIGURES FOR EACH THERMOMECHANICAL TREATMENT. THE PLASTIC STRAIN ANISOTROPY, WHICH WAS CONSISTENT WITH THE BASAL POLE TEXTURE, WAS FOUND TO DEPEND UPON BOTH THE METHOD AND THE TEMPERATURE OF MECHANICAL WORKING. THE GREATEST R VALUES OCCURRED FOR THE COLD-ROLLED MATERIAL WHERE THE SHEET NORMAL ROTATES TO WITHIN 15 DEG FROM THE BASAL POLE. IN ADDITION, R IS NOT CONSTANT UNDER UNIAXIAL TENSION BUT GENERALLY INCREASES WITH THE AMOUNT OF PLASTIC STRAIN. THE VARIATION OF R WITH UNIAXIAL STRAIN DEPENDS UPON THE FORMING TEMPERATURE, WITH THE LARGEST CHANGES OCCURRING IN SAMPLES THAT WERE ROLLED AT ROOM TEMPERATURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-716 032 20/12
NAVAL ORDNANCE LAB WHITE OAK MD

FATIGUE OF THICK-WALLED, HIGH-PRESSURE CYLINDERS. (U)

JUN 70 24P DAWSON,V. C. D. ;GOELLER, J. E. ;

REPT. NO. NOLTR-70-135

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, FATIGUE(MECHANICS)), CYLINDRICAL BODIES, STRESSES, TENSILE PROPERTIES, CREEP (U)
IDENTIFIERS: AUTOFRETTAGE (U)

THE REPORT CONTAINS THE RESULTS OF A STUDY TO DEVELOP A THEORETICAL APPROACH WHEREBY UNIAXIAL FATIGUE DATA CAN BE USED TO PREDICT THE PERMISSIBLE NUMBER OF CYCLES OF A THICK-WALLED CYLINDER. EXPERIMENTAL DATA FROM THE LITERATURE WERE EXAMINED ON OPEN END AND CLOSED END CYLINDERS IN AN AUTOFRETTAGED AND NON-AUTOFRETTAGED CONDITION WITH WALL RATIOS FROM 1.2 TO 2.0. DISTORTION ENERGY WAS USED TO REDUCE THE TRIAXIAL STRESS STATE TO AN EQUIVALENT UNIAXIAL STRESS. A NEW METHOD WAS THEN DEVELOPED WHEREBY THE NUMBER OF CYCLES COULD BE PREDICTED AS A FUNCTION OF THE MEAN AND ALTERNATING PRESSURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-716 527 20/11 13/13
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

APPLIED METHODS OF CALCULATION OF SHELLS AND THIN-WALLED CONSTRUCTIONS. (U)

NOV 70 510P AVDONIN,A. S. ;
REPT. NO. FTD-6040101
TASK: DIA-T65-04-18A/19A

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF MONO. PRIKLADNYE METODY RASCHETA OBOLOCHEK I TONKOSTENNYKH KONSTRUKTSII, MOSCOW, 1969 P1-402, BY ROBERT ALLEN POTTS, AND RAY E. ZARZA.

DESCRIPTORS: (*STRUCTURAL SHELLS, LOADING(MECHANICS)), STABILITY, BENDING, STRESSES, HYDROSTATIC PRESSURE, PRESSURE VESSELS, RODS, PARTIAL DIFFERENTIAL EQUATIONS, STIFFENED CYLINDERS, NUMERICAL ANALYSIS, USSR (U)
IDENTIFIERS: TRANSLATIONS, PLATES(STRUCTURAL MEMBERS) (U)

THE BOOK DISCUSSES CALCULATION CONCERNING SHELLS OF REVOLUTION AND ELEMENTS OF THIN-WALLED CONSTRUCTIONS FOR STRENGTH, RIGIDITY AND STABILITY UNDER VARIOUS FORMS OF FORCE ACTION. SUCH PROBLEMS INCLUDE, FOR EXAMPLE, CALCULATIONS OF DOUGHNUT-SHAPED SHELLS, LOADED BY INTERNAL PRESSURE, SPHERICAL SHELLS, LOADED BY LOCAL LOADS, ETC. PROBLEMS OF STABILITY OF SHELLS ARE GIVEN IN THE BOOK IN A NEW FORMULATION. THE CONDITIONS ON THE CONTOUR OF HALF-WAVES ARE DETERMINED BY LOADING CONDITIONS AND THE PROPOSED FORM OF LOSS OF STABILITY. THE NEW APPROACH TO THESE PROBLEMS REFINES AND EXPANDS THE CONCEPT OF STABILITY OF SHELLS AND GIVES THE POSSIBILITY OF SOLVING PRACTICALLY IMPORTANT PROBLEMS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-716 862 20/11 13/4
NEW YORK UNIV BRONX DEPT OF AERONAUTICS AND ASTRONAUTICS

BUCKLING OF A CIRCULAR ELASTIC RING CONFINED TO A UNIFORMLY CONTRACTING CIRCULAR BOUNDARY. (U)

SEP 70 49P EL-BAYOUMY,LOTFI ;
REPT. NO. NYU-AA-70-18
CONTRACT: AF-AFOSR-813-67
PROJ: AF-9768, AF-9782
TASK: 976802, 978201
MONITOR: AFOSR 70-2337TR

UNCLASSIFIED REPORT

DESCRIPTORS: (*ELASTIC SHELLS, BUCKLING(MECHANICS)), (*PRESSURE VESSELS, REINFORCING MATERIALS), RINGS, REINFORCED CONCRETE, LOADING(MECHANICS), THERMAL STABILITY, HYDROSTATIC PRESSURE, STRAIN(MECHANICS), BOUNDARY VALUE PROBLEMS, STRESSES, CALCULUS OF VARIATIONS, THESES (U)

THE PRESENT PAPER CONTAINS A DETAILED ANALYSIS OF THE TITLE PROBLEM. ALSO INCLUDED IS A REVIEW OF RELATED BUCKLING PROBLEMS AVAILABLE IN THE LITERATURE. THE BUCKLED CONFIGURATION IS ASSUMED TO CONSIST OF TWO REGIONS, VIZ., THE DETACHED REGION, WHERE SHALLOW ARCH APPROXIMATIONS ARE ADOPTED, AND AN ATTACHED REGION, WHERE THE RING ASSUMES A CONSTANT CURVATURE. THE PROBLEM IS TREATED AS A VARIATIONAL PROBLEM WITH VARIABLE END POINTS FOR WHICH THE VARIATIONAL FORMULATION YIELDS, IN ADDITION TO THE DIFFERENTIAL EQUATIONS AND BOUNDARY CONDITIONS, A TRANSVERSALITY CONDITION, DETERMINING THE EXTEND OF THE DETACHED REGION. THE RESULTS INDICATE THAT THE RING WILL NOT BUCKLE UNLESS EXTERNAL DISTURBANCES ARE PRESENT. A DISCUSSION OF ENERGY BARRIERS SHOWS THAT THE RING'S ABILITY TO SUSTAIN EXTERNAL DISTURBANCES DIMINISHES AS THE CONTRACTION INCREASES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-717 301 20/11
WATERVLIET ARSENAL N Y

FATIGUE CRACK TOLERANCE IN THICK WALLED CYLINDERS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
NOV 70 49P THROUP,JOSEPH F. ;
REPT. NO. WVT-7035
PROJ: DA-1-T-062105-A-328

UNCLASSIFIED REPORT

DESCRIPTORS: (*CYLINDRICAL BODIES, FATIGUE(MECHANICS)), (*PRESSURE VESSELS, FATIGUE(MECHANICS)), (*CRACKS, TOLERANCES(MECHANICS)), STRESSES, BENDING, FRACTOGRAPHY, CALIBRATION, TOUGHNESS, PRESSURIZATION, LOADING(MECHANICS), MATHEMATICAL MODELS (U)
IDENTIFIERS: CRACK SHAPES (U)

A K-CALIBRATION FOR PART-THROUGH WALL CRACKS OF SEMI-ELLIPTICAL SHAPE IN A PRESSURIZED THICK WALLED CYLINDER IS OBTAINED IN TWO PARTS WHICH INCLUDE THE STRESS GRADIENT IN THE TUBE WALL AND THE EFFECT OF THE PRESSURE ACTING WITHIN THE CRACK CAVITY. USING K IN A LIMITING CONDITION, THE CALIBRATION PROVIDES A FAILURE CRITERION FOR ESTIMATION OF CRITICAL CRACK DEPTHS FOR BRITTLE FRACTURE. THE DISPERSION IN CRACK TOLERANCE MAY BE ESTIMATED FROM THE DISTRIBUTION IN TEMPERING TEMPERATURES AMONG THE FORGINGS. THIS EMPLOYS THE RELATIONSHIPS OF THE MECHANICAL PROPERTIES TO TEMPERING TEMPERATURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-717 618 18/9
NAVAL RESEARCH LAB WASHINGTON D C

SM-1A REACTOR PRESSURE VESSEL SURVEILLANCE: IRRADIATION OF FOLLOW-ON CAPSULES IN THE SM-1 REACTOR, (U)

DEC 70 15P SERPAN,CHARLES Z. , JR;
REPT. NO. NRL-7211
CONTRACT: AT(49-5)-2110
PROJ: NRL-M01-14, RR007-11-41-5409

UNCLASSIFIED REPORT

DESCRIPTORS: (*POWER REACTORS, PRESSURE VESSELS), (*NEUTRON FLUX, MEASUREMENT), REACTOR CONTROL, NEUTRON TRANSPORT THEORY, REACTOR CORES, REACTOR FUEL ELEMENTS, ANNEALING, NEUTRON DETECTORS, RADIATION DAMAGE (U)
IDENTIFIERS: SM-1A REACTORS (U)

THREE CAPSULES CONTAINING CHARPY V-NOTCH SPECIMENS OF A DUPLICATE RING-FORGING OF SM-1A REACTOR PRESSURE-VESSEL STEEL WERE PREPARED FOR PLACEMENT INTO THE SM-1A REACTOR AS PART OF THE CONTINUING VESSEL SURVEILLANCE PROGRAM OF THAT REACTOR. THESE CAPSULES PLUS TWO MORE CONTROL CAPSULES WERE IRRADIATED IN THE SM-1 REACTOR AT 440 DEGREES F (227 DEGREES C) TO MATCH THE SM-1A REACTOR PRESSURE-VESSEL TRANSITION TEMPERATURE AND FLUENCE CONDITIONS PRIOR TO THE SM-1A ANNEALING. THE CAPSULES WERE THEN FURNACE ANNEALED UNDER THE SM-1A REACTOR ANNEALING CONDITIONS AND WERE REIRRADIATED IN THE SM-1 TO THE FLUENCE AND TRANSITION-TEMPERATURE CONDITIONS OF THE SM-1A AT THE END OF CORE 3. CONTROL POINTS WERE ESTABLISHED AFTER EACH STEP. SIGNIFICANT DIFFERENCES IN FLUX LEVELS AT A POINT IN THE SM-1 REACTOR WERE NOTED BETWEEN AN EARLIER FLUX-MONITOR IRRADIATION AND THE SUBSEQUENT SURVEILLANCE-CAPSULE IRRADIATIONS. THESE DIFFERENCES WERE FOUND TO BE DIRECTLY RELATED TO THE TWO DIFFERENT FUEL CORES IN PLACE AT THOSE TIMES. HIGHER FLUXES WERE GENERATED AT THE CORE EDGE DURING THE FLUX MONITOR IRRADIATION SINCE THE CORE WAS OLD AND THE CENTER WAS CONSIDERABLY BURNED OUT. LOWER FLUXES WERE MEASURED AT THE SAME CORE-EDGE LOCATION DURING THE SURVEILLANCE-CAPSULE IRRADIATIONS SINCE A NEW, SMALLER DIAMETER CORE PEAKED IN FLUX TOWARD THE CENTER. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-718 _5 18/9
ARMY ENGINEER REACTORS GROUP FORT BELVOIR VA ENGINEERING DIV

SM-1A VAPOR CONTAINER LEAK TEST: 3-5
AUGUST 1970. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
FEB 71 28P JOHNSON,GEORGE ;
REPT. NO. ED-7101

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURIZED WATER REACTORS, PRESSURE VESSELS), (*PRESSURE VESSELS, LEAKAGE(FLUID)), POWER REACTORS, VAPOR PRESSURE, LEAK DETECTORS, TESTS, DATA PROCESSING SYSTEMS (U)
IDENTIFIERS: SM-1A REACTOR (U)

THE REPORT PRESENTS THE RESULTS OBTAINED DURING THE LEAK RATE TESTS ON THE SM-1A VAPOR CONTAINER. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-718 812 13/13 13/10
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

WINDOWS FOR EXTERNAL OR INTERNAL HYDROSTATIC PRESSURE VESSELS. PART V. CONICAL ACRYLIC WINDOWS UNDER LONG-TERM PRESSURE APPLICATION OF 10,000 PSI. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUL 69-JUN 70,
JAN 71 79P STACHIW,J. D. ;MOODY,W. A. ;
REPT. NO. NCEL-TR-708
PROJ: YF38-535-005-01-005

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO PART 4, AD-497 272.

DESCRIPTORS: (*PRESSURE VESSELS, TRANSPARENT PANELS), (*TRANSPARENT PANELS, *ACRYLIC RESINS), UNDERWATER VEHICLES, CONICAL BODIES, HYDROSTATIC PRESSURE, FAILURE(MECHANICS) (U)
IDENTIFIERS: *WINDOWS (U)

CONICAL ACRYLIC WINDOWS OF 30-, 60-, 90-, 120= AND 150-DEGREE INCLUDED ANGLE AND 0.500 TO 1.250 T/D (THICKNESS TO MINOR DIAMETER RATIO) HAVE BEEN SUBJECTED IN THEIR MOUNTING FLANGES TO 10,000 PSI OF HYDROSTATIC PRESSURE FOR 500 AND 1,000 HOURS AT AMBIENT ROOM TEMPERATURE. THE DISPLACEMENT OF THE WINDOWS THROUGH THE FLANGE MOUNTING HAS BEEN RECORDED AS A FUNCTION OF TIME AND PLOTTED FOR THE READY REFERENCE OF THE DESIGNER. THE MAGNITUDE OF THE WINDOW DISPLACEMENT HAS BEEN FOUND TO BE A FUNCTION OF TIME, ANGLE, TEMPERATURE, T/D RATIO AND PRESSURE. IT IS RECOMMENDED THAT FOR SAFE SINGLE SUSTAINED OPERATION OF 1,000 HOUR DURATION AT 10,000 PSI HYDROSTATIC LOADING AT AMBIENT TEMPERATURE THE WINDOWS SHOULD HAVE AN INCLUDED CONICAL ANGLE > OR = 90 DEGREES AND A MINIMUM T/D RATIO OF 0.750. FOR SUSTAINED LOADINGS IN EXCESS OF 1,000 HOURS THE MINIMUM T/D RATIO OF 1.000. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-718 970 13/4 13/13
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

DESIGN OF MULTI-REGION PRESSURE VESSELS USING MAXIMUM SHEAR THEORY. (U)

DESCRIPTIVE NOTE: TECHNICAL NOTE.
JAN 71 47P LEYENAAR,ANTONIO R. ISTACK, THOMAS E. ;
REPT. NO. TN-1971-5
CONTRACT: F19628-70-C-0230
PROJ: AF-649L
MONITOR: ESD TR-71-9

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, DESIGN), SHEAR STRESSES, DEFORMATION, DUCTILITY, BRITTLENESS, MATHEMATICAL MODELS, COMPUTER PROGRAMS (U)
IDENTIFIERS: SHEAR THEORY, AUTOFRETTAGE, FORTRAN, COMPUTER AIDED DESIGN (U)

A METHOD IS OUTLINED FOR MULTI-REGION PRESSURE VESSELS DESIGN CALCULATIONS USING THE MAXIMUM SHEAR THEORY. THIS TREATMENT IS EMPLOYED DUE TO THE SIMPLICITY OF THE METHOD AND BECAUSE THE RESULTS ARE QUITE CONSERVATIVE FOR BOTH DUCTILE AND BRITTLE MATERIALS. A PROCEDURE FOR OBTAINING AN OPTIMUM DESIGN IS GIVEN FOR A DESIRED PERCENTAGE OF AUTO-FRETTAGE ON THE INNER WALL OF THE PRESSURE VESSEL. A COMPUTER PROGRAM WAS WRITTEN IN FORTRAN II LANGUAGE AND THE VARIOUS DESIGN POSSIBILITIES WERE EXECUTED BY IBM-1620 COMPUTER. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-720 876 14/4 13/4
ARMY MISSILE COMMAND REDSTONE ARSENAL ALA ARMY PROPULSION LAB AND CENTER

DETERMINATION OF PROOF TEST LEVEL FOR TEST-DEGRADABLE COMPONENTS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
NOV 70 29P MAYKUT,A. R. ;
REPT. NO. RK-TR-70-19
PROJ: DA-1-M-262303-A-214

UNCLASSIFIED REPORT

DESCRIPTORS: (*RELIABILITY, TEST METHODS), (*PRESSURE VESSELS, RELIABILITY), STRESSES, OPTIMIZATION, FILAMENT WOUND CONSTRUCTION (U)
IDENTIFIERS: PROOF TESTS (U)

WHEN VIEWED FROM THE STANDPOINT OF STRESS/STRENGTH INTERFERENCE THEORY, CONVENTIONAL PROOF TESTING PRACTICE YIELDS A COMPONENT POPULATION WITH AN INITIAL RELIABILITY OF 1.0. SUCH MAY NOT BE THE CASE, HOWEVER, IF THE COMPONENTS ARE DEGRADED BY THE PROOF TEST. THE PROOF TEST IS THUS REVIEWED FOR THE CASE OF TEST-DEGRADABLE COMPONENTS. METHODOLOGY IS DEVELOPED WHICH ALLOWS THE DETERMINATION OF AN OPTIMUM TEST LEVEL. FINALLY, THIS THEORY IS APPLIED TO FILAMENT-WOUND PRESSURE VESSELS, AND IT IS FOUND THAT TEST-DEGRADABLE COMPONENTS REQUIRE A PROOF TEST USAGE ENTIRELY DIFFERENT FROM THAT FOLLOWED WITH COMPONENTS NOT SUBJECT TO THIS DEGRADATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-720 676 18/10 11/6
NAVAL RESEARCH LAB WASHINGTON D C

ANALYSIS OF RADIATION-INDUCED EMBRITTLEMENT GRADIENTS ON FRACTURE CHARACTERISTICS OF THICK-WALLED PRESSURE VESSEL STEELS. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
MAR 71 23P LOSS,F. J. ;HAWTHORNE,J. R. ;SERPAN,C. Z. , JR.;PUZAK,P. P. ;
REPT. NO. NRL-7209
CONTRACT: AT(49-5)-2110
PROJ: RR007-11-41-5409, NRL-M01-14

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, RADIATION DAMAGE), (*REACTOR MATERIALS, EMBRITTLEMENT), FRACTURE(MECHANICS), PRESSURE VESSELS (U)
IDENTIFIERS: STEEL A-533B (U)

THE FRACTURE BEHAVIOR OF THICK-WALLED NUCLEAR VESSELS IS CONSIDERED FOR THE CASE OF A RADIATION-INDUCED TOUGHNESS GRADIENT THROUGH THE WALL WHICH CHARACTERISTICALLY RESULTS FROM NEUTRON ATTENUATION BY THE WALL MATERIAL ITSELF. FRACTURE-SAFE DESIGN ANALYSES BASED ON LINEAR ELASTIC FORMULATIONS OR EXTRAPOLATIONS OF THESE FORMULATIONS TO THE ELASTIC-PLASTIC REGIME ARE NOT SUFFICIENTLY DEVELOPED TO CHARACTERIZE THE INTEGRATED BEHAVIOR OF A WALL WHOSE TOUGHNESS CAN RANGE FROM BRITTLE AT THE INNER SURFACE TO HIGHLY DUCTILE AT THE OUTER SURFACE. SOLUTIONS TO THE PROBLEM IN THE FORESEEABLE FUTURE WILL BE OBTAINED ONLY BY EXPERIMENTAL MEANS. THE PRESENT APPROACH USES THE FRACTURE ANALYSIS DIAGRAM (FAD) TOGETHER WITH A NEW INTERPRETATIVE METHOD FOR FRACTURE EXTENSION RESISTANCE BASED ON MODIFIED DYNAMIC TEAR SPECIMENS AS THE TOOLS FOR GRADIENT ASSESSMENTS. WITH THESE TECHNIQUES THE SIGNIFICANCE OF THE TOUGHNESS GRADIENT THROUGH THE WALL IS ASSESSED IN TERMS OF THICH SECTION MECHANICAL CONSTRAINT, AND FRACTURE CHARACTERISTIC OF THE COMPLETE WALL ARE PREDICTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-720 678 18/10 11/6 13/8
NAVAL RESEARCH LAB WASHINGTON D C

MAJOR FACTORS AFFECTING NEUTRON IRRADIATION EMBRITTLEMENT OF PRESSURE-VELLEL STEELS AND WELDMENTS. (U)

DESCRIPTIVE NOTE: SUMMARY REPT.,
OCT 70 22P STEELE,LENDELL E. ;
REPT. NO. NRL-7176
CONTRACT: AT(49-5)-2110
PROJ: RR007-41-11-5409, NRL-M01-14

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, RADIATION DAMAGE), (*WELDS, RADIATION DAMAGE), REACTOR MATERIALS, EMBRITTLEMENT, PRESSURE VESSELS (U)
IDENTIFIERS: *NEUTRON IRRADIATION EMBRITTLEMENT (U)

THE MAJOR ASPECTS OF NEUTRON IRRADIATION EMBRITTLEMENT IN STEEL PRESSURE VESSELS OF LARGE COMMERCIAL NUCLEAR-POWER REACTORS ARE REVIEWED, DRAWING ON THE RESULTS OF AEC-SPONSORED PROGRAMS WHICH HAVE EMPHASIZED RESEARCH RELATED TO REACTOR VESSEL RELIABILITY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-721 292 11/6 13/4 20/12
MARTIN MARIETTA CORP DENVER COLO DENVER DIV

THE EFFECTS OF THE SURFACE LAYER ON PLASTIC DEFORMATION AND CRACK PROPAGATION. (U)

DESCRIPTIVE NOTE: SEMI-ANNUAL REPT.,
MAR 71 15P KRAMER,IRVIN R. ;
REPT. NO. CR-71-2
CONTRACT: DAAG46-70-C-0102, ARPA ORDER-180
MONITOR: AMMRC CR-71-2/1

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, CRACK PROPAGATION), (*TITANIUM ALLOYS, CRACK PROPAGATION), (*PRESSURE VESSELS, FRACTURE(MECHANICS)), STRESSES, LOADING(MECHANICS), FATIGUE(MECHANICS) (U)
IDENTIFIERS: ALUMINUM ALLOY 2014, TITANIUM ALLOY 6AL 4V, PLASTIC DEFORMATION (U)

THE REPORT DESCRIBES THE EFFECT OF A SURFACE LAYER ON THE RATE OF CRACK PROPAGATION AND, BASED ON THIS KNOWLEDGE, THE AUTHOR PROPOSES TO IMPROVE THE CRACK PROPAGATION RESISTANCE OF METALS USED IN PRESSURE VESSELS. THE QUALIFICATION OF PRESSURE VESSEL HARDWARE IS USUALLY ACHIEVED BY THE PROOF TEST METHOD. THE MAXIMUM SIZE OF THE FLAW THAT IS PRESENT CAN BE PREDICTED FROM FRACTURE MECHANICS. HOWEVER, CRACKS CAN GROW BELOW THE CRITICAL STRESS INTENSITY K(C) AND CAN CAUSE LEAK FAILURE. THEREFORE, THE SUBCRITICAL CRACK GROWTH CHARACTERISTICS OF METALS ARE IMPORTANT IN PRESSURE VESSEL MATERIAL SELECTION. AN EVALUATION OF THE CRACK GROWTH RATE UNDER SUSTAINED OR CYCLIC LOADING UNDER THE SERVICE STRESS GIVES A MEASURE OF RELIABILITY OF THE HARDWARE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-724 641 13/4 20/11
WATERVLIET ARSENAL N Y

STRESS INTENSITY FACTORS FOR INTERNALLY PRESSURIZED THICK-WALL CYLINDERS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 71 26P UNDERWOOD,JOHN H. ;
REPT. NO. WVT-7124
PROJ: DA-1-T-061102-B-32-A

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, STRESSES), PRESSURIZATION, LOADING(MECHANICS), CRACKS, FATIGUE(MECHANICS), NUMERICAL ANALYSIS (U)
IDENTIFIERS: FRACTURE MECHANICS (U)

SELECTED STRESS INTENSITY FACTOR SOLUTIONS FROM THE LITERATURE ARE RELATED TO THE PROBLEM OF INTERNALLY PRESSURIZED THICK-WALL CYLINDERS WITH STRAIGHT-FRONT AND CURVED-FRONT CRACKS. THE RECENT K SOLUTIONS OF BOWIE + FREESE AND RICE + LEVY ARE COMBINED IN AN ESTIMATE OF THE K SOLUTION FOR A PRESSURIZED CYLINDER WITH A SEMIELLIPTICAL CRACK ORIGINATING ALONG THE INNER WALL. THE ESTIMATE OF K IS COMPARED WITH THE AVAILABLE EXPERIMENTAL AND ANALYTICAL K DATA FOR SHALLOW CRACKS. THE ESTIMATED K SOLUTION IS MODIFIED TO ACCOUNT FOR VARIOUS COMPLEX LOADINGS IN PRESSURIZED CYLINDERS. INCLUDED ARE MODIFICATIONS TO DESCRIBE LACK OF PRESSURE ON THE CRACK SURFACES IN PRESSURIZED CYLINDERS, RESIDUAL STRESS IN THE WALL OF PRESSURIZED CYLINDERS, A COMBINATION OF AN UNPRESSURIZED CRACK AND RESIDUAL STRESS IN THE WALL. THE EFFECT OF CYLIC PRESSURE LOADING ON K IS ALSO DISCUSSED IN RELATION TO THROOP'S WORK ON FATIGUE OF PRESSURIZED CYLINDERS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-725 463 18/8 11/6 20/12
NAVAL RESEARCH LAB WASHINGTON D C

STRUCTURE AND COMPOSITION EFFECTS ON IRRADIATION SENSITIVITY OF PRESSURE VESSEL STEELS. (U)

71 12P STEELE,L. E. I

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN AMERICAN SOCIETY FOR TESTING AND MATERIALS, SPEC. TECH. PUB. N484, P164-175 1970.

DESCRIPTORS: (*STEEL, RADIATION DAMAGE), (*REACTOR SYSTEM COMPONENTS, PRESSURE VESSELS), MICROSTRUCTURE, METALLOGRAPHY, GRAIN STRUCTURES(METALLURGY), GRAIN SIZE, IMPURITIES, MECHANICAL PROPERTIES (U)

THE PAPER EMPHASIZES ENGINEERING IMPLICATIONS OF THE EFFECTS OF STRUCTURE AND COMPOSITION ON THE IRRADIATION SENSITIVITY OF STEELS. THEORETICAL CONSIDERATIONS ARE DISCUSSED AND REVIEWED AS THEY RELATE TO POSSIBLE EXPLANATIONS FOR OBSERVATIONS ON THE SUBJECT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-725 796 13/4 21/4
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT E V BRUNSWICK (WEST GERMANY)

BERECHNUNG OBERIRDISCHER FLUESSIGKEITSLAGERTANKS (CALCULATION REGARDING ABOVE GROUND LIQUID STORAGE TANKS), (U)

70 42 NIEDERSTADT,G. ;
REPT. NO. DFVLR-SONDERDRUCK-93

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ZEITSCHRIFT KUNSTSTOFFE, V60 N12 P1071-1073 1970. NO COPIES FURNISHED BY DDC OR NTIS.
SUPPLEMENTARY NOTE: TEXT IN GERMAN.

DESCRIPTORS: (*PRESSURE VESSELS, STRESSES), (*FUELS, STORAGE TANKS), FLEXURAL STRENGTH, CORROSION, SAFETY, MATERIALS, MATHEMATICAL ANALYSIS, WEST GERMANY (U)

AUSGEHEND VON DEN ,,RICHTLINIEN FUR ORTSFESTE OBERIRDISCHE TANKS AUS GFK ZUR LAGERUNG VON HEIZOL UND DIESELKRAFTSTOFFEN,, WURDE UNTERSUCHT, OB ES ZULASSIG IST, LAGERBEHALTER IN ANLEHNUNG AN DIE VORSCHRIFTEN FUR DRUCKBEHALTER (VORLAUFIGES AD-MERKBLATT N 1) ZU BERECHNEN.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-725 847 13/4 20/11
ILLINOIS INST OF TECH CHICAGO DEPT OF MECHANICS

PLASTIC ANALYSIS AND PRESSURE--VESSEL SAFETY, (U)

JUN 71 32P HODGE,PHILIP G. , JR;
REPT. NO. DOMIIT-1-45
CONTRACT: N00014-67-A-0210-0002
PROJ: NR-064-429

UNCLASSIFIED REPORT

DESCRIPTORS: (*STRUCTURAL PROPERTIES, *PLASTICITY), (*PRESSURE VESSELS, STANDARDS), DESIGN, FATIGUE(MECHANICS), DEFORMATION, PRESSURIZATION, FAILURE(MECHANICS), STRUCTURAL SHELLS, LOADING(MECHANICS), SAFETY (U)
IDENTIFIERS: PRESSURE VESSEL CODES (U)

THE ROLE OF PLASTICITY THEORY IN THE DESIGN OR ANALYSIS OF PRESSURE VESSELS IS CONSIDERED. IT IS SHOWN THAT THE THEORY IS HELPFUL IN PREDICTING SOME BUT NOT ALL OF THE POSSIBLE CAUSES OF PRESSURE-VESSEL FAILURE. VARIOUS MODELS FOR PLASTICITY THEORY ARE DISCUSSED. THE CURRENT STATE OF TECHNOLOGY IN THIS FIELD IS SURVEYED AND SOME INDICATIONS ARE GIVEN FOR FUTURE LINES OF RESEARCH. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-734 926 13/4 11/6
AUBURN UNIV ALA ENGINEERING EXPERIMENT STATION

CRACK TOLERATING ABILITY OF A HIGH-STRENGTH BIAXIALLY STRESSED CYLINDRICAL PRESSURE VESSEL CONTAINING A SURFACE CRACK. (U)

DESCRIPTIVE NOTE: REPT. NO. 9 (FINAL) 29 JUN 70-31 DEC 71,
DEC 71 30P MAYNOR,HAL W. ;WALDROP, RICHARD S. ;
CONTRACT: DAAH01-70-C-1424

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, FRACTURE(MECHANICS)), STEEL, CRACKS, CYLINDRICAL BODIES, STRESSES, CRACK PROPAGATION (U)
IDENTIFIERS: STEEL 4130 (U)

TEST SPECIMENS IN THE FORM OF CYLINDRICAL PRESSURE VESSELS WERE DEEP DRAWN FROM AISI 4130 STEEL AND HEAT TREATED TO AN AVERAGE UNIAXIAL YIELD STRENGTH (0.2 PER CENT OFFSET) OF 207 KSI. EACH VESSEL WAS PROVIDED WITH AN INITIAL SURFACE CRACK CONSISTING OF A MECHANICALLY-PRODUCED SLOT, TERMINATING AT EACH END IN A FATIGUE-INDUCED, HAIRLINE-TYPE CRACK. STRAIN GAGES MOUNTED AT BOTH ENDS OF THE CRACK PROVIDED A MEASURE OF THE DISPLACEMENT AT THESE LOCATIONS DURING THE DEVELOPMENT OF INTERNAL PRESSURES CULMINATING IN BURSTING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-735 874 20/11 13/10.1
NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER BETHESDA MD

AN EVALUATION OF FINITE ELEMENT METHODS FOR THE COMPUTATION OF ELASTIC STRESS INTENSITY FACTORS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
DEC 71 80P OGLESBY,JOHN J. ;LOMACKY, OLES ;
REPT. NO. NSRDC-3751
PROJ: SF35-422-210
TASK: 15055

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, STRESSES), (*SUBMARINE HULLS, FRACTURE(MECHANICS)), CRACK PROPAGATION, LOADING(MECHANICS), FATIGUE(MECHANICS), ELASTICITY, STRAIN(MECHANICS), PROGRAMMING(COMPUTERS) (U)
IDENTIFIERS: FINITE ELEMENT ANALYSIS (U)

THE REPORT SUMMARIZES THE FIRST PHASE OF THE DEVELOPMENT OF COMPUTER PROGRAMS FOR CALCULATING ELASTIC STRESS INTENSITY FACTORS AT THE CRITICAL (FATIGUE-PRONE) DETAILS OF PRESSURE HULLS. THE WORK IS PART OF A BROADER STUDY AIMED AT THE DEVELOPMENT OF ANALYTICAL METHODS FOR FATIGUE AND FRACTURE ANALYSIS OF SUBMARINE HULLS. TWO NEW TECHNIQUES ARE INTRODUCED. ONE IS BASED ON DIRECT APPLICATION OF THE LINEAR ELASTIC FRACTURE MECHANICS RELATIONS BETWEEN THE STRESS INTENSITY FACTORS AND THE NEAR CRACK TIP DISPLACEMENT FIELDS UTILIZING TWO-TERM SERIES EXPANSION. THE STRESS INTENSITY FACTORS ARE COMPUTED DIRECTLY FROM THE NODAL DISPLACEMENTS OBTAINED PREVIOUSLY FROM THE FINITE ELEMENT PROGRAM. THE SECOND TECHNIQUE IS BASED ON DIRECT INCORPORATION INTO THE FINITE ELEMENT COMPUTER PROGRAM OF THE STRAIN ENERGY OF THE SINGULAR ELEMENT ENCLOSING THE CRACK TIP. EXAMPLES OF THE APPLICATION OF SUCH METHODS TO SEVERAL SIMPLY AXISYMMETRIC AND TWO-DIMENSIONAL PLANE STRAIN PROBLEMS ARE PRESENTED ALONG WITH RECOMMENDATIONS FOR FUTURE STUDIES AND APPLICATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-736 594 11/9 13/10
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

WINDOWS FOR EXTERNAL OR INTERNAL HYDROSTATIC PRESSURE VESSELS. PART VI. CONICAL ACRYLIC WINDOWS UNDER LONG-TERM PRESSURE APPLICATION AT 5,000 PSE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. MAR 69-OCT 70,
NOV 71 66P STACHIW,J. D. ;GRAY,K.
O. ;
REPT. NO. NCEL-TR-747
PROJ: YF51-543-008-01-001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO PART 5, AD-718 812.

DESCRIPTORS: (*ACRYLIC RESINS, HYDROSTATIC PRESSURE), (*UNDERWATER VEHICLES, *TRANSPARENT PANELS), PRESSURE VESSELS, CONICAL BODIES, PRESSURIZATION, DEFORMATION, TOLERANCES(MECHANICS), LOADING(MECHANICS), TEST METHODS (U)
IDENTIFIERS: *UNDERWATER HABITATS, *WINDOWS (U)

CONICAL ACRYLIC WINDOWS WITH FIVE INCLUDED ANGLES (ALPHA) FROM 30 TO 150 DEGREES AND THICKNESS-TO-MINOR-DIAMETER (T/D) RATIOS FROM 0.375 TO 1.00 HAVE BEEN SUBJECTED TO 5,000 PSI OF SUSTAINED HYDROSTATIC LOADING FOR UP TO 1,000 HOURS IN THE TEMPERATURE RANGE FROM 65F TO 75F WHILE THE AXIAL DISPLACEMENT OF THE WINDOWS THROUGH THE FLANGE HAS BEEN MONITORED. THE MAGNITUDE OF AXIAL DISPLACEMENT WAS FOUND TO BE A FUNCTION OF ALPHA, T/D RATIO, TEMPERATURE, AND DURATION OF LOADING. ONLY WINDOWS WITH T/D RATIOS GREATER THAN OR EQUAL TO 1.000, 0.625, 0.500, 0.500, AND 0.500 FOR 30-, 60-, 90-, 120-, AND 150-DEGREE CONICAL ANGLES, RESPECTIVELY, WERE FOUND TO BE FREE OF CRACKS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-737 190 18/9 18/8
NAVAL RESEARCH LAB WASHINGTON D C

PROCEDURES FOR INTERPRETING THE STRUCTURAL IMPLICATIONS OF RADIATION-DAMAGE SURVEILLANCE RESULTS ON NUCLEAR PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
DEC 71 21P STEELE,L. E. ;SERPAN,C. Z. , JR;
REPT. NO. NRL-7358
CONTRACT: AT(49-5)-5409
PROJ: NRL-M01-14, RR022-11-41-5409

UNCLASSIFIED REPORT

DESCRIPTORS: (*REACTOR SYSTEM COMPONENTS, PRESSURE VESSELS), (*PRESSURE VESSELS, RADIATION DAMAGE), (*STEEL, FRACTURE(MECHANICS)), NEUTRON REACTIONS, EMBRITTLEMENT, THERMAL STRESSES, TRANSITION TEMPERATURE, NON-DESTRUCTIVE TESTING (U)

THE STRUCTURAL IMPLICATIONS OF RADIATION EFFECTS TO NUCLEAR REACTOR PRESSURE VESSELS ARE ASSESSED PRIMARILY THROUGH SURVEILLANCE PROGRAMS IN WHICH THE PROPERTIES OF THE VESSEL ARE PROJECTED FROM AN EVALUATION OF SMALL SPECIMENS OF THE VESSEL STEEL. IN THE USA, THE CURRENT FRACTURE-SAFE CRITERION REQUIRES THAT THE VESSEL OPERATING TEMPERATURE, AT CERTAIN STRESS LEVELS, BE AT THE FTE (FRACTURE TRANSITION ELASTIC) TEMPERATURE, DEFINED AS NDT+60F(33C), DERIVED FROM SURVEILLANCE MEASUREMENTS. REVIEW OF AVAILABLE DATA FROM FIVE REACTOR SURVEILLANCE PROGRAMS INDICATES THAT THIS CRITERION IS ADEQUATE FOR THE VESSELS CONCERNED. COMPLETE ASSURANCE OF FRACTURE-SAFE OPERATING CONDITIONS CAN BE ATTAINED THROUGH A LIMIT-ANALYSIS PROCEDURE THAT CONSIDERS AND INTEGRATES THE EFFECTS OF FIVE FACTORS: (A) THE RADIATION-INDUCED SHIFT IN TRANSITION TEMPERATURE, (B) THE INITIAL SHELF ENERGY, (C) THE RADIATION-REDUCED DUCTILE SHELF ENERGY, (D) THE EFFECTS OF THE FLUENCE (AND TOUGHNESS) GRADIENT THROUGH A THICK VESSEL WALL, AND (3) THE EFFECTS OF THICKNESS-INDUCED MECHANICAL CONSTRAINT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-743 630 13/13 20/11
CALIFORNIA UNIV BERKELEY

ELASTIC-PLASTIC ANALYSIS OF THICK-WALLED PRESSURE VESSELS WITH SHARP DISCONTINUITIES. (U)

FEB 71 6P LARSEN,K. ;POPOV,P. ;

CONTRACT: DAHC04-69-C-0037
MONITOR: AROD 828414-A

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN THE JNL. OF ENGINEERING FOR INDUSTRY, P1016--1020 NOV 71.
SUPPLEMENTARY NOTE: PRESENTED AT THE NATIONAL CONGRESS ON PRESSURE VESSELS AND PIPING (1ST), HELD IN SAN FRANCISCO, CALIF. MAY 10-12, 1971. AMERICAN SOCIETY OF MECHANICAL ENGINEERS, PAPER NO. ASME-71-PVP-23.

DESCRIPTORS: (*PRESSURE VESSELS, STRUCTURAL PROPERTIES), STRUCTURAL SHELLS, BODIES OF REVOLUTION, PLASTICITY, ELASTICITY, NUMERICAL METHODS AND PROCEDURES (U)
IDENTIFIERS: *ELASTIC-PLASTIC ANALYSIS, FINITE ELEMENT ANALYSIS (U)

APPLICATION OF SPECIAL ISOPARAMETRIC FINITE ELEMENTS IS PRESENTED FOR THE ELASTIC-PLASTIC ANALYSIS OF SHELLS OF REVOLUTION. GENERAL ISOPARAMETRIC ELEMENTS ARE SELECTED WHICH, IN THE FORM OF A LAYERED SYSTEM, ARE CAPABLE OF REPRESENTING A SOLID OF REVOLUTION. THE CUSTOMARY KIRCHHOFF-LOVE HYPOTHESIS IS NOT INVOKED AND SOLUTIONS THEREFORE APPLY BOTH TO THIN AND THICK SHELLS OF REVOLUTION. SHARP DISCONTINUITIES IN GEOMETRY, CIRCUMFERENTIAL RIBS AND/OR GROOVES, AS WELL AS CELLULAR WALLS MAY BE STUDIED. A SPECIAL FEATURE IS THE DEVELOPMENT OF AN ELEMENT PERMITTING SLIDING AT THE ELEMENT INTERFACES WITH OR WITHOUT FRICTION. THE ILLUSTRATIVE EXAMPLES INCLUDE A PRESSURE VESSEL WITH A CIRCUMFERENTIAL CRACK IN THE WALL THICKNESS, AND A CIRCULAR PLATE CONSISTING OF TWO DISKS WHICH CAN SLIDE ALONG THEIR INTERFACE. THE SOLUTIONS ARE LIMITED TO AXIALLY SYMMETRIC PROBLEMS. FLOW THEORY OF PLASTICITY IS USED IN THE INELASTIC REGIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-744 941 18/10 11/6 18/8
NAVAL RESEARCH LAB WASHINGTON D C

IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. 1 FEB-30 APR 72,
MAY 72 46P STEEL,L. E. ISMIDT,F. A. , JR.ISPRAGUE,J. A. ISHAHINIAN,P. IWATSON, H. E. ;
REPT. NO. NRL-MR-2441
PROJ: RR022-11-41-5409, RR022-11-41-5425

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-739 312.

DESCRIPTORS: (*REACTOR MATERIALS, *RADIATION DAMAGE), (*STEEL, RADIATION DAMAGE), PRESSURE VESSELS, WELDS, FATIGUE(MECHANICS), FRACTURE(MECHANICS), CRACK PROPAGATION, ELECTRON MICROSCOPY, NEUTRON BEAMS, IRON ALLOYS, NOTCH TOUGHNESS, LIQUID METAL COOLED REACTORS, ION BOMBARDMENT, STAINLESS STEEL (U)
IDENTIFIERS: STEEL 316, NEUTRON IRRADIATION, ION IMPLANTATION (U)

THE RESEARCH PROGRAM INVOLVES A BROAD STUDY OF THE EFFECTS OF NUCLEAR RADIATION UPON MATERIALS. THE REPORT, COVERING RESEARCH FOR THE PERIOD 1 FEBRUARY - 30 APRIL 1972, INCLUDES: (1) ELECTRON MICROSCOPY OBSERVATIONS OF RADIATION DAMAGE IN PRESSURE VESSEL STEELS AND IRON ALLOYS, (2) THE EFFECT OF NEUTRON IRRADIATION ON FATIGUE CRACK PROPAGATION IN AUSTENITIC STAINLESS STEEL AT HIGH TEMPERATURE, (3) A STUDY OF RADIATION REDUCTION IN NOTCH TOUGHNESS OF STAINLESS STEEL SUBMERGED ARC WELDMENTS, (4) THE EFFECT OF CYCLOTRON-INJECTED HELIUM ON THE FATIGUE PROPERTIES OF 316 STAINLESS STEEL, AND (5) PRELIMINARY RESULTS FROM AN ENVIRONMENTAL EXPOSURE OF FANDIDATE CTR FIRST-WALL STRUCTURAL ALLOYS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-745 299 11/6 18/10 18/8
NAVAL RESEARCH LAB WASHINGTON D C

DAMAGE-FUNCTION ANALYSIS OF NEUTRON EMBRITTLEMENT IN STEEL AT REACTOR SERVICE TEMPERATURES. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUN 72 18P SERPAN,CHARLES Z. , JR;
REPT. NO. NRL-7405
PROJ: NRL-M01-14, RR022-11-41
TASK: 5409

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, *RADIATION DAMAGE), (*REACTOR MATERIALS, STEEL), (*PRESSURE VESSELS, REACTOR MATERIALS), NEUTRON REACTIONS, FAST NEUTRONS, THERMAL NEUTRONS, TRANSITION TEMPERATURE, LIFE EXPECTANCY (U)
IDENTIFIERS: NEUTRON EMBRITTLEMENT, STEEL A-302B (U)

NEUTRON-INDUCED INCREASES IN THE BRITTLE-DUCTILE TRANSITION TEMPERATURE (DELTA TT) OF A302-B PRESSURE VESSEL STEEL HAVE BEEN MEASURED FROM IRRADIATIONS IN A NUMBER OF REACTOR ENVIRONMENTS FOR NEUTRAON FLUENCES REPRESENTATIVE OF PRESSURE VESSEL DESIGN LIFETIMES. WHILE THESE MEASUREMENTS HAVE PERMITTED FORMULATION OF THE TRENDS NECESSARY FOR DELTA TT PROJECTIONS IN OPERATING REACTORS, CERTAIN ANOMALOUS RESULTS HAVE BEEN OBSERVED WHEREIN MEASUREMENTS FELL OUTSIDE THE NOMINAL LIMITS OF THE TRENDS. AS A SUMMATION OF RESEARCH ON THIS STEEL AND TO RESOLVE THE ANOMALOUS RESULTS, A DAMAGE FUNCTION WAS DERIVED FOR THE NEUTRON-INDUCED DELTA TT RESPONSE OF A302-B STEEL AT REACTOR OPERATING TEMPERATURES. THE DAMAGE FUNCTION IS A SERIES OF WEIGHTING FACTORS FOR THE DAMAGING CAPACITY OF NEUTRONS OF ALL ENERGY GROUPS IN A REACTOR SPECTRUM; THESE FACTORS THUS INDICATE THE RELATIVE IMPORTANCE OF SPECIFIC ENERGY-GROUP NETURONS TO THE DAMAGING PROCESS. TECHNIQUES FOR DERIVATION OF THE DAMAGE FUNCTION AND THE COMPLEMENTING CORRELATION-EVALUATION METHOD ARE DIRECTLY APPLICABLE TO MORE ADVANCED REACTOR SYSTEMS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-746 111 11/6 13/8
NAVAL RESEARCH LAB WASHINGTON D C

CHARACTERIZATION OF GTA WELDMENTS IN 10NI-8CO-2CR-1MO STEEL. (U)

JUN 72 36P STONESIFER,FRED R. ISMITH, HERSCHEL L. I

REPT. NO. NRL-MR-2466
PROJ: NRL-84F01-15

UNCLASSIFIED REPORT

DESCRIPTORS: (*NICKEL ALLOYS, *WELDING), (*PRESSURE VESSELS, CORROSION-RESISTANT ALLOYS), AUSTENITE, INERT GAS WELDING, TENSILE PROPERTIES, IMPACT TESTS, NOTCH TOUGHNESS, MICROSTRUCTURE (U)
IDENTIFIERS: STEEL 10NI 8CO 2CR 1MO, STEEL HY-180, STEEL HY-210, *HIGH STRENGTH STEELS, GAS TUNGSTEN ARC WELDING (U)

THE STUDY OF 10NI-8CO-2CR-1MO STEEL INCLUDES EVALUATIONS OF TENSILE, IMPACT, HARDNESS, FRACTURE TOUGHNESS PROPERTIES, AND METALLOGRAPHIC FEATURES. BASE PLATE AND THREE WELDMENTS IN ONE-INCH THICKNESSES ARE EXAMINED TO COMPARE AS-WELDED PROPERTIES WITH THOSE OBTAINED AFTER REAGING, AND RESULTS OF WELDING THE 10%NI ALLOY WITH 9-4-20 WIRE AS OPPOSED TO A MATCHING WELD WIRE COMPOSITION. CRITICAL CRACK SIZES ARE CALCULATED FOR THE MATERIAL. THE MOST DESIRABLE WELD PROPERTIES ARE OBTAINED USING THE MATCHING WELD WIRE AND A REAGING CYCLE. HOWEVER, THE IMPROVEMENT GAINED THROUGH REAGING IS PROBABLY NOT SUFFICIENT TO JUSTIFY THE ADDITIONAL COST FOR MOST PRACTICAL APPLICATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-746 878 11/2 13/10
NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER BETHESDA MD

THE STRUCTURAL BEHAVIOR OF GLASS PRESSURE HULLS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUN 72 111P NISHIDA,KANEHIRO ;
REPT. NO. NSRDC-3863
PROJ: S4636
TASK: 12326

UNCLASSIFIED REPORT

DESCRIPTORS: (*SUBMARINE HULLS, *GLASS), STRUCTURAL PROPERTIES, PRESSURE VESSELS, DEEP SUBMERGENCE, HEMISPHERICAL SHELLS, JOINTS, FRACTURE(MECHANICS), HYDROSTATIC PRESSURE, FATIGUE(MECHANICS) (U)
IDENTIFIERS: GLASS JOINTS (U)

A REPORT ON GLASS PRESSURE VESSELS FOR DEEP SUBMERGENCE IS PRESENTED. EMPHASIS IS ON THE STRUCTURAL RESPONSE OF SPHERICAL AND HEMISPHERICAL GLASS SHELLS UNDER EXTERNAL HYDROSTATIC AND CYCLIC PRESSURE. RESULTS OF EARLIER PROGRAMS ARE REVIEWED. A COMPUTERIZED ANALYSIS TRADING OFF THE VARIABLES IN THE JOINT PROBLEM IS PRESENTED. FINAL JOINT GEOMETRIES ARE DISCUSSED AND DATA ON CHEMICALLY STRENGTHENED GLASS HEMISPHERICAL SHELLS WITH EQUATORIAL JOINT RINGS UNDER FATIGUE CONDITIONS ARE PRESENTED. THE RESULTS INDICATE RELATIVELY EFFICIENT (W/D = 0.5), SMALL PRESSURE VESSELS OF CHEMICALLY STRENGTHENED GLASS ARE PRACTICAL FOR UNMANNED NONCRITICAL APPLICATIONS TO 20,000 FT. NINE 10-INCH DIAMETER CHEMICALLY STRENGTHENED GLASS HEMISPHERICAL SHELLS OF PPG 1080 GLASS WITH OVERALL WEIGHT TO DISPLACEMENT RATIOS OF 0.5 SURVIVED AT LEAST 3000 CYCLES TO 20,000 FT. EACH HEMISPHERE WAS THEN SUBJECTED TO A PROOF TEST TO 30,000 FT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-746 885 11/4 13/4
NAVAL ORDNANCE LAB WHITE OAK MD

PROPERTIES OF GRAPHITE FIBER COMPOSITES AT CRYOGENIC TEMPERATURES. (U)

DESCRIPTIVE NOTE: REPORT FOR JUN 67-AUG 69 ON TASKS 1 AND 2.
MAY 70 101P SIMON,ROBERT A. ;ALFRING, RICHARD ;
REPT. NO. NOLTR-69-183
MONITOR: NASA CR-72652

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREVIOUSLY ANNOUNCED AS N70-31828.

DESCRIPTORS: (*COMPOSITE MATERIALS, FILAMENT WOUND CONSTRUCTION), (*FILAMENT WOUND CONSTRUCTION, *CRYOGENICS), (*CARBON FIBERS, FILAMENT WOUND CONSTRUCTION), MECHANICAL PROPERTIES, PRODUCTION, STRAIN(MECHANICS), GRAPHITE, EPOXY PLASTICS, BINDERS, TANKS(CONTAINERS), TENSILE PROPERTIES, PRESSURE VESSELS, SPACECRAFT COMPONENTS (U)
IDENTIFIERS: *FIBER COMPOSITES (U)

NEED FOR LOW-WEIGHT, CRYOGENIC PRESSURE VESSELS FOR SPACECRAFT RESULTED IN AN INVESTIGATION TO MEASURE GRAPHITE FIBER COMPOSITE PROPERTIES AT CRYOGENIC TEMPERATURES. UNDERTAKEN WAS AN INVESTIGATION OF MECHANICAL PROPERTIES OF SEVERAL FIBERS AND RESINS AS COMPOSITE STRANDS, BARS, AND NOL RINGS. IT SHOWED THAT COMPOSITE MODULI INCREASED BY 0 TO 20% AT -195C, AND COMPOSITE TENSILE STRENGTHS DECREASED BY 0 TO 30%. ALSO STUDIED WAS THE DESIGN, FABRICATION, AND TESTING OF GRAPHITE FILAMENT WOUND PRESSURE VESSELS. THE PRESSURE VESSEL PERFORMANCE FACTOR OF PV/W SHOWED THE GRAPHITE VESSELS TO BE COMPETITIVE WITH BORON AND TWO-THIRDS AS HIGH AS FIBERGLASS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDM07

AD-747 217 13/10 13/3
BECHTEL CORP SAN FRANCISCO CALIF

DEVELOPMENT OF END-CLOSURE SYSTEMS FOR UNDERSEA CONCRETE PRESSURE RESISTANT CYLINDRICAL HULLS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 3 JUN 71-24 MAY 72, MAY 72 119P LEONARD,ROBERT G. ;MORKEN, PAUL G. ;
CONTRACT: N62399-71-C-0017
MONITOR: NCEL CR-72.017

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY NAVAL FACILITIES ENGINEERING COMMAND, WASHINGTON, D. C.

DESCRIPTORS: (*PRESSURE VESSELS, BULKHEADS), (*STRUCTURAL SHELLS, UNDERWATER), CONSTRUCTION MATERIALS, CONFIGURATION, CONCRETE, POSITIONING DEVICES(MACHINERY), HANDLING, SEALS, FEASIBILITY STUDIES (U)
IDENTIFIERS: UNDERWATER STRUCTURES, CLOSURES (U)

THE PURPOSE OF THIS STUDY WAS TO DEVELOP END-CLOSURE SYSTEMS FOR UNDERSEA CONCRETE PRESSURE RESISTANT HULLS. THESE END-CLOSURES MUST SEAL AND LOCK CONCRETE CYLINDERS RANGING FROM 20 TO 60 FT. IN DIAMETER. THEY MUST BE REMOVABLE PERMITTING FULL ACCESS WHEN THE CYLINDERS ARE LOCATED ON THE OCEAN FLOOR IN 1000. FT. OF WATER AND WHEN THE CYLINDERS ARE LOCATED ON LAND. THE STUDY CONSIDERS END-CLOSURE CONFIGURATION INCLUDING GEOMETRY AND MATERIAL, ACTUATION OR HANDLING METHODS AND SEALING AND LOCKING ALTERNATES. AREAS REQUIRING ADDITIONAL RESEARCH AND DEVELOPMENT ARE IDENTIFIED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-748 147 18/10 11/6
NAVAL RESEARCH LAB WASHINGTON D C

INTERPRETING THE STRUCTURAL SIGNIFICANCE OF TIME DEPENDENT EMBRITTLEMENT PHENOMENA TO NUCLEAR REACTOR PRESSURE VESSEL INTEGRITY. (U)

72 10P STEEL,L. E. ;WATSON,H. E. ;

CONTRACT: AT(49-5)-2110

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN THE JNL. OF MATERIALS, V7 N2 P178-187 JUN 72.

DESCRIPTORS: (*NUCLEAR REACTORS, PRESSURE VESSELS), (*PRESSURE VESSELS, EMBRITTLEMENT), HYDROGEN EMBRITTLEMENT, DISPERSION HARDENING, FATIGUE(MECHANICS), AGING(MATERIALS), NEUTRON REACTIONS, STEEL (U)

DURING FABRICATION AND IN SUBSEQUENT SERVICE, A NUCLEAR REACTOR PRESSURE VESSEL IS SUBJECTED TO FACTORS, SUCH AS THERMAL AGING, STRAIN AGING, NEUTRON RADIATION, WHICH MAY CAUSE EMBRITTLEMENT. LIMITED AVAILABLE DATA SUGGEST THAT COMBINED EFFECTS OF THESE FACTORS ARE USUALLY NO MORE SEVERE THAN RADIATION EMBRITTLEMENT ALONE FOR THE STEELS OF CURRENT VESSEL CONSTRUCTION. HOWEVER, LOW CYCLE FATIGUE MAY COMPLICATE THE IRRADIATED CONDITION BY EXTENDING FLAWS. THE CURRENT STATE OF KNOWLEDGE OF SUCH COMBINED ENVIRONMENTAL EFFECTS AND OF TECHNIQUES FOR FAILURE PREVENTION REQUIRES A LIMIT APPROACH WHICH WILL ASSURE A DUCTILE CONDITION AT ALL TIMES WHILE THE VESSEL IS IN SERVICE. THE ANALYSIS MUST INTEGRATE IRRADIATED TRANSITION TEMPERATURE, FRACTURE ENERGY LEVEL, RADIATION INDUCED GRADIENT, AND THICKNESS CONSTRAINT EFFECTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-748 583 11/9 13/10
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

WINDOWS FOR EXTERNAL OR INTERNAL HYDROSTATIC PRESSURE VESSELS. PART VII. EFFECT OF TEMPERATURE AND FLANGE CONFIGURATIONS ON CRITICAL PRESSURE OF 90-DEGREE CONICAL ACRYLIC WINDOWS UNDER SHORT-TERM LOADING. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUN 69-JUN 70,
AUG 72 55P STACHIW,J. D. ;MCKAY,J.
R. ;
REPT. NO. NCEL-TR-773
PROJ: YF51.543-008-01-001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPORT DATED NOV 71, AD-736 594.

DESCRIPTORS: (*ACRYLIC RESINS, HYDROSTATIC PRESSURE), (*UNDERWATER VEHICLES, TRANSPARENT PANELS), PRESSURE VESSELS, CONICAL BODIES, PRESSURIZATION, DEFORMATION, LOADING(MECHANICS), FRACTURE(MECHANICS), TOLERANCES(MECHANICS) (U)
IDENTIFIERS: *UNDERWATER HABITATS, *WINDOWS (U)

CONICAL ACRYLIC WINDOWS OF 90-DEGREE INCLUDED ANGLE AND 0.083 TO 0.775 THICKNESS-TO-MINOR-DIAMETER (T/D) RATIOS HAVE BEEN TESTED TO ULTIMATE FAILURE UNDER SHORT-TERM HYDROSTATIC LOADING. THE AMBIENT TEMPERATURE WAS VARIED FROM 32F TO 90F AND THE RELATIONSHIP BETWEEN MINOR WINDOW DIAMETER (D) AND MINOR WINDOW CAVITY DIAMETER IN THE FLANGE (DF) VARIED FROM 0.970 TO 1.500. THE TEST RESULTS SHOW THAT THE CRITICAL PRESSURE OF IDENTICAL WINDOWS AT 90F IS APPROXIMATELY 10% TO 20% LESS THAN AT 70F, AND AT 32F IT IS APPROXIMATELY 15% TO 25% MORE THAN AT 70F. TO IMPROVE THE CRITICAL PRESSURE OF 90-DEGREE CONICAL ACRYLIC WINDOWS, IT IS RECOMMENDED THAT SUCH WINDOWS BE DESIGNED WITH A WINDOW/FLANGE MISMATCH RATIO OF D/D GREATER THAN 1.00, THE EXACT MAGNITUDE DEPENDING ON THE WINDOW'S T/D RATIO, SERVICE, AND DESIGN CONSIDERATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-749 029 13/10 11/9
NAVAL UNDERSEA CENTER SAN DIEGO CALIF

ACRYLIC PLASTIC HEMISPHERICAL SHELLS FOR NUC UNDERSEA ELEVATOR. (U)

DESCRIPTIVE NOTE: RESEARCH REPT. 1971-72.
SEP 72 35P STACHIW,J. D. ;
REPT. NO. NUC-TP-315
PROJ: ZFXX-412-001

UNCLASSIFIED REPORT

DESCRIPTORS: (*HEMISPHERICAL SHELLS, DESIGN), (*PRESSURE VESSELS, UNDERWATER), ELEVATORS, ACRYLIC RESINS, MATERIAL FORMING, MANUFACTURING METHODS, LOADING(MECHANICS), HYDROSTATIC TESTS (U)
IDENTIFIERS: UNDERWATER ELEVATORS, FREE FORMING FABRICATION, EVALUATION (U)

FREE-FORMED, FLANGED, ACRYLIC HEMISPHERICAL SHELLS WITH A NOMINAL 27-IN. MEDIAN RADIUS HAVE BEEN EXPERIMENTALLY EVALUATED FOR SERVICE AS EXTERNAL PRESSURE HULLS WITH A NOMINAL 56-FT DEPTH. BECAUSE THE FREE-FORMING FABRICATION TECHNIQUE PRODUCES HEMISPHERES WITH SIGNIFICANT VARIATION IN THICKNESS AND SPHERICITY, UNEVEN STRESS DISTRIBUTION RESULTS DURING EXTERNAL HYDROSTATIC LOADING. AS A RESULT, EXTREME CARE MUST BE EXERCISED WHEN UTILIZING FREE-FORMED ACRYLIC HEMISPHERES BECAUSE THEIR ELASTIC INSTABILITY PRESSURE AND MAGNITUDE OF STRESSES CANNOT BE PREDICTED ON THE BASIS OF EQUATIONS FOR IDEAL ACRYLIC SPHERES. USING AN EXPERIMENTAL APPROACH TO THE EVALUATION OF 54-IN.-MEDIAN-DIAMETER HEMISPHERES, IT WAS FOUND THAT NOMINALLY 1-IN.-THICK ACRYLIC PLATE STOCK IS ADEQUATELY THICK FOR FREE-FORMING OF SHELLS THAT WILL BE UTILIZED AS PRESSURE HULLS FOR AN OPERATIONAL DEPTH OF 56 FT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-749 653 7/4 14/2 20/13
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

APPARATUS USED FOR THE EXPERIMENTAL STUDY OF THE THERMODYNAMIC PROPERTIES OF GASES AT PRESSURES OF UP TO 10-12 KILOBARS AND AT TEMPERATURES UP TO 3000K. (U)

AUG 72 11P ANTANOVICH,A. A. ;PLOTNIKOV, M. A. ;
REPT. NO. FTD-HT-23-1266-72

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF MONO. TEPLOFIZICHESKIE SVOISTVA GAZOV (THERMOPHYSICAL PROPERTIES OF GASES) MOSCOW, 1970 P156-159. BY PAUL J. REIFF, JR.

DESCRIPTORS: (*LABORATORY EQUIPMENT, *PRESSURE VESSELS), (*GASES, *THERMODYNAMICS), DESIGN, HIGH-PRESSURE RESEARCH, HIGH-TEMPERATURE RESEARCH, COMPRESSIVE PROPERTIES, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

SPECIAL APPARATUS HAS BEEN DEVELOPED FOR THE STUDY OF THE THERMODYNAMIC PROPERTIES OF GASES AT HIGH TEMPERATURES. THE APPARATUS CONSISTS OF A THICK WALLED POWER CYLINDER WITH INTERNAL PRESSURE AMOUNTING TO 10-12 KILOBARS. CHANNELS OF A WATER COOLING SYSTEM ARE LOCATED IN THE POWER CYLINDER WALL. THE INTERNAL SPACE OF THE THERMAL CHAMBER IS HEATED BY AN ELECTRIC COIL ON WHICH SHORT CERAMIC TUBES HAVE BEEN PLACED. A PYROLITIC GRAPHITE BUSHING IS USED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-849 039 19/1 20/11
PICATINNY ARSENAL DOVER N J AMMUNITION ENGINEERING LAB

SIMPLIFIED SHELL ANALYSIS (EDGE AND INTERIOR INFLUENCE COEFFICIENTS FOR PRESSURE VESSELS WITH SPHERICAL CAP). (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
FEB 69 72P GRIFFEL,WILLIAM :
MONITOR: PA TR-3868

UNCLASSIFIED REPORT

DESCRIPTORS: (*PROJECTILES, STRESSES), DEFORMATION, INTERFACES, CYLINDRICAL BODIES, LOADING(MECHANICS), EQUATIONS, PROGRAMMING(COMPUTERS), PRESSURE VESSELS (U)
IDENTIFIERS: REINFORCING RINGS (U)

A RAPID AND ACCURATE FORMULATION OF THE COMPATIBILITY EQUATIONS AT THE JUNCTION OF THE CYLINDER AND SPHERICAL CAP IS MORE CONVENIENT WHEN USING DIMENSIONLESS COEFFICIENTS. IT IS THE OBJECT OF THIS STUDY TO RELIEVE SOME OF THE TEDIOUS AND TIME-CONSUMING CALCULATIONS INVOLVED IN COMPUTING THE DISCONTINUITY STRESSES AT THE JUNCTION. THE COEFFICIENTS AS TABULATED WERE PROGRAMMED ON A COMPUTER. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-851 958 11/6 19/7 20/11
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED RESEARCH LAB

DEVELOPMENT OF IMPROVED BIAXIAL STRENGTH IN TITANIUM ALLOY ROCKET MOTOR CASES THROUGH TEXTURE HARDENING. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 MAR 67-15 FEB 69,
FEB 69 94P FITZPATRICK,J. M. ;CROSSLEY, F. A. ;HOFFMAN,O. ;TSUI,E. Y. W. ;LEWIS, R. E. ;
CONTRACT: F04611-67-C-0074
MONITOR: AFRPL TR-69-59

UNCLASSIFIED REPORT

DESCRIPTORS: (*ROCKET CASES, STRUCTURAL PROPERTIES), (*TITANIUM ALLOYS, HARDENING), DRAWING(MACHINE PROCESSING), PRESSURE VESSELS, HYDROSTATIC TESTS, RUPTURE, LOADING(MECHANICS), ANISOTROPY, STRESSES, ROLLING(METALLURGY), ELECTRON BEAM WELDING, INERT GAS WELDING, METALLOGRAPHY, MEMBRANES, TENSILE PROPERTIES, FRACTURE(MECHANICS) (U)
IDENTIFIERS: TITANIUM ALLOY 6AL 4V, TITANIUM ALLOY 7AL 2.5MO, *TEXTURE HARDENING (U)

THE REPORT SUMMARIZES THE RESULTS OF A FOUR-PHASE PROGRAM, THE OBJECTIVE OF WHICH WAS TO DEMONSTRATE THE MERIT OF A HEAT-TREATABLE, TEXTURE-HARDENED, TITANIUM ALLOY FOR USE IN ROCKET MOTOR CASES. THE DETAILS OF HYDROBURST TESTING OF A 17 IN. -DIAMETER SPHERICAL PRESSURE VESSEL ARE INCLUDED. SHEET ROLLING AND HEAT-TREATING PROCEDURES WERE INVESTIGATED TO DETERMINE SUITABLE PROCESSES BY WHICH TEXTURE-HARDENED SHEET COULD BE PRODUCED. AN INVESTIGATION OF THE SHEAR-FORMING PROCESS FOR PRODUCING SUITABLY TEXTURED TI-6AL-4V CYLINDERS OF 18-IN. DIAMETER WAS MADE. A WELDING STUDY TO DETERMINE THE EFFECTS OF DIFFERENT WELDING PROCEDURES ON THE TEXTURE TUNGSTEN-INERT-GAS AND ELECTRON-BEAM TECHNIQUES WERE EMPLOYED. A DEMONSTRATION OF A SPHERICAL TANK FABRICATION AND HYDROBURST TEST WAS MADE USING TEXTURE-HARDENED TI-6AL-4V ALLOY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-855 520 19/7 11/6 13/8
AEROJET-GENERAL CORP FULLERTON CALIF ORDNANCE DIV

PLASMA ARC WELDING PROCESS DEVELOPMENT PROGRAM. VOLUME I. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. JUL 66-NOV 68,
APR 69 246P GAW,W. D. ;STARR,G. L. ;
REPT. NO. AGC-1070-01(01)FP-VOL-1
CONTRACT: AF 33(615)-5353
PROJ: AF-9-800
MONITOR: AFML TR-68-379-VOL-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-855 521.

DESCRIPTORS: (*ROCKET CASES, *ARC WELDING), PRESSURE VESSELS, NICKEL ALLOYS, TITANIUM ALLOYS, METAL PLATES, IMPACT TESTS, TENSILE PROPERTIES, YIELD POINT, ELONGATION, STRESSES, FAILURE(MECHANICS), ELECTRODES, SPHERES, PLASMA JETS, TUNGSTEN, CONFIGURATION (U)
IDENTIFIERS: TITANIUM ALLOY 6AL 4V, NICKEL ALLOY INCONEL 718, NICKEL ALLOY RENE 41, *PLASMA ARC WELDING, WEIGHT SAVING, EVALUATION (U)

THE OBJECTIVE OF WORK REPORTED IN THIS VOLUME WAS TO EVALUATE PLASMA ARC WELDING TORCHES FOR FABRICATING ROCKET MOTOR CASES AND WEIGHT-CRITICAL UNFIRED PRESSURE VESSELS. WELDING STUDIES WERE ACCOMPLISHED UTILIZING 6AL-4V TITANIUM, INCONEL 718, AND RENE 41. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-887 498 14/2 13/10
NAVAL SHIP RESEARCH AND DEVELOPMENT LAB ANNAPOLIS MD

NONDESTRUCTIVE TESTING FOR PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, MAR 70 93P PETRISKO,EDWIN M. ;
REPT. NO. NSRDL/A-1-18
PROJ: NAVFAC-PO-0-0006, YF38.534.010.02.002

UNCLASSIFIED REPORT

DESCRIPTORS: (*UNDERWATER VEHICLES, PRESSURE VESSELS), (*PRESSURE VESSELS, NON-DESTRUCTIVE TESTING), ULTRASONIC RADIATION, MAGNETIC FIELDS, TEST METHODS, TEST EQUIPMENT, CRACKS, STRESSES, DETECTION, WELDS, RADIOGRAPHY (U)
IDENTIFIERS: *MAGNETIC PARTICLE TESTS, *ULTRASONIC TESTS, *LIQUID PENETRANT TESTS (U)

A STATE-OF-TECHNOLOGY SURVEY WAS CONDUCTED ON NONDESTRUCTIVE TESTING TECHNIQUES FOR PRESSURE VESSELS. THE PURPOSE OF THE INVESTIGATION WAS TO PROVIDE INFORMATION FOR THE DESIGN, CONSTRUCTION, AND CERTIFICATION OF HIGH-PRESSURE TANKS. THE SURVEY SHOWED THAT CONSIDERABLE RESEARCH IS ATTEMPTING TO EXTEND THE USEFULNESS OF NONDESTRUCTIVE TESTING TO MEET MORE DEMANDING CRITERIA OF CERTIFICATION AND TO EXPAND THE CAPABILITY TO NEARLY ALL ASPECTS OF ASSURING MATERIAL ADEQUACY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-869 053 11/6 13/8
BATTELLE MEMORIAL INST COLUMBUS OHIO DEFENSE METALS INFORMATION CENTER

REVIEW OF RECENT DEVELOPMENTS, ALUMINUM AND MAGNESIUM. (U)

MAY 70 5P HALLOWELL,J. B. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPORT DATED 17 OCT 69, AD-860 405.

DESCRIPTORS: (*ALUMINUM ALLOYS, REVIEWS), (*MAGNESIUM ALLOYS, REVIEWS), EXTRUSION, CYLINDRICAL BODIES, LANDING GEAR, PRESSURE VESSELS, ELECTRON BEAM WELDING, HEAT TREATMENT, CORROSION RESISTANCE, LITHIUM ALLOYS, HONEYCOMB CORES, AGING(MATERIALS) (U)
IDENTIFIERS: ANNOUNCEMENT BULLETINS (U)

CONTENTS: LANDING-GEAR CYLINDER BACK EXTRUDED; PRESSURE VESSELS FABRICATED BY EB WELDING OF 2219 ALLOY; EFFECTS OF COMPOSITION AND HEAT TREATMENT ON STRENGTH AND CORROSION RESISTANCE; CHARACTERISTICS OF X7080, 7178 AND 7075 ALLOYS; EVALUATION OF 7049-T73 ALUMINUM; AGING OF MAGNESIUM-LITHIUM-ALUMINUM ALLOYS; AND MG-LI ALLOY HONEYCOMB CORES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-869 476 13/4 14/2 22/4
MARTIN MARIETTA CORP DENVER COLO DENVER DIV

VERIFICATION TESTING OF CONJUGATE STRUCTURE. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
APR 70 246P THOMPSON,E. DALE ;
REPT. NO. MCR-70-62
CONTRACT: F04611-68-C-0055
MONITOR: AFRPL TR-70-47

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, NON-DESTRUCTIVE TESTING), ALTITUDE CHAMBERS, COMPRESSIVE PROPERTIES, LOADING(MECHANICS), STRESSES, HYDROSTATIC TESTS, STRAIN(MECHANICS), CRACKS, METAL JOINTS, WELDS, PHOTOMICROGRAPHY, DEFLECTION, FAILURE(MECHANICS) (U)
IDENTIFIERS: CONJUGATE STRUCTURES, FAILURE ANALYSIS (U)

THE CONJUGATE STRUCTURE CONSISTED OF A FORWARD SKIRT, FORWARD DOME, FORWARD BARREL, COMMON DOME, AFT BARREL, AFT CONE AND AFT SKIRT. THE FORWARD AND AFT BARREL SECTIONS WERE MADE OF TITANIUM ROLL DIFFUSION BONDED TRUSS CORE PANELS. THE CONJUGATE STRUCTURE WAS DELIVERED TO THE MARTIN MARIETTA CORPORATION, DENVER DIVISION FOR STRUCTURAL TESTING TO DEMONSTRATE ITS ABILITY TO WITHSTAND DESIGN CONDITIONS BY A SUBJECTION TO LIMIT LOADS AND LIMIT INTERNAL TANK PRESSURES. MARTIN MARIETTA CORPORATION RECEIVING INSPECTION IDENTIFIED STRUCTURAL DISCREPANCIES WHICH BROUGHT ABOUT A CHANGE IN THE TEST CONTRACT. INSTEAD OF THE ORIGINALLY PLANNED THREE TEST CONDITIONS, THE CONJUGATE STRUCTURE WAS SUBJECTED TO A DETAILED INSPECTION AND A STRUCTURAL REPAIR OPERATION, AND THE TEST PORTION WAS MODIFIED TO INCLUDE FIVE TEST CONDITIONS. THE FIRST TWO OF THESE TEST CONDITIONS WERE COMPLETED. A VISUAL AND RADIOGRAPHIC INSPECTION, MADE AFTER THE COMPLETION OF THE SECOND TEST, IDENTIFIED SEVEN AREAS OF STRUCTURAL FAILURES. ONE FAILURE, A 42.5 IN. LONG CRACK IN THE INNER WELD OF THE AFT TANK BARREL TO THE LOWER Y-RING CIRCUMFERENTIAL WELD JOINT, WAS SEVERE ENOUGH TO PROHIBIT CONTINUED TESTING. THE TANK BARREL SECTIONS, MADE UP OF ROLL-DIFFUSION-BONDED-TRUSS-CORE, SUCCESSFULLY CARRIED THE DESIGN LIMIT LOADS AND INTERNAL TANK PRESSURES ASSOCIATED WITH THE TWO TEST CONDITIONS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-870 390 11/6 20/12
BATTELLE MEMORIAL INST COLUMBUS OHIO DEFENSE METALS INFORMATION CENTER

REVIEW OF RECENT DEVELOPMENTS, LOW-TEMPERATURE PROPERTIES OF METALS. (U)

JUN 70 6P CAMPBELL,J. E. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPORT DATED 27 FEB 70, AD-866 215.

DESCRIPTORS: (*METALS: LOW-TEMPERATURE RESEARCH), (*CRYOGENICS, METALS), STAINLESS STEEL, DUCTILITY, TOUGHNESS, TITANIUM, TITANIUM ALLOYS, ALUMINUM ALLOYS, PRESSURE VESSELS, THERMAL CONDUCTIVITY, RESISTANCE(ELECTRICAL), NICKEL ALLOYS (U)
IDENTIFIERS: ANNOUNCEMENT BULLETINS (U)

CONTENTS: DUCTILITY OF AUSTENITIC STAINLESS STEEL AT -320F; TOUGHNESS OF PRECRACKED TITANIUM SHEET AT -423F; CRYOGENIC PROPERTIES OF TITANIUM ALLOYS IN THE RUSSIAN LITERATURE; PROPERTIES OF ALUMINUM ALLOYS TO -423F; PRESSURE VESSEL TESTS AT CRYOGENIC TEMPERATURES; AND THERMAL CONDUCTIVITY AND ELECTRICAL RESISTIVITY OF FOUR ALLOYS AT CRYOGENIC TEMPERATURES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM07

AD-873 130 13/4 20/11
NAVAL SHIP RESEARCH AND DEVELOPMENT LAB ANNAPOLIS MD

STRESS ANALYSIS/MEASUREMENT TECHNIQUES FOR PRESSURE VESSELS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. OCT 69-JAN 70,
JUL 70 66P PETRISKO,EDWIN M. ;
REPT. NO. NSRDL/A-1-21
PROJ: NAFVAC-PO-0-0006, YF38-534-010

UNCLASSIFIED REPORT

DESCRIPTORS: (*PRESSURE VESSELS, STRESSES), STRAIN(MECHANICS), TEST METHODS, PHOTOELASTICITY, STRAIN GAGES, PIEZOELECTRIC GAGES, COATINGS, BRITTLENESS, BONDING, STATE-OF-THE-ART REVIEWS (U)
IDENTIFIERS: BRITTLE COATINGS (U)

A STATE-OF-TECHNOLOGY SURVEY WAS CONDUCTED ON STRESS ANALYSIS AND MEASUREMENT TECHNIQUES FOR PRESSURE VESSELS. THE PURPOSE OF THE INVESTIGATION WAS TO PROVIDE CURRENT INFORMATION FOR THE DESIGN, CONSTRUCTION AND CERTIFICATION OF HIGH PRESSURE CHAMBERS. THE SURVEY SHOWED CURRENT LIMITATIONS OF THESE TECHNIQUES, AND ONGOING RESEARCH ATTEMPTING TO ADVANCE THE STRESS ANALYSIS/MEASUREMENT TECHNIQUES. (AUTHOR) (U)

CORPORATE AUTHOR - MONITORING AGENCY

•ADVANCED RESEARCH PROJECTS AGENCY ARLINGTON VA

• • •

ARPA-E62
ELASTIC-PLASTIC ANALYSIS OF PRESSURE VESSEL COMPONENTS.
AD-682 482

•AEROJET-GENERAL CORP AZUSA CALIF

• • •

0623 01 3
STUDY OF THE EFFECTS OF THICKNESS ON THE PROPERTIES OF LAMINATED FOR UNDERWATER PRESSURE VESSELS.
AD-296 424

•AEROJET-GENERAL CORP FULLERTON CALIF ORDNANCE DIV

• • •

AGC-1070-01(01)FP-VOL-1
PLASMA ARC WELDING PROCESS DEVELOPMENT PROGRAM. VOLUME I. (AFML-TR-68-379-VOL-1)
AD-855 520

•AEROJET-GENERAL CORP SACRAMENTO CALIF

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AGC-062713
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